"Powering Nova Scotia's Economy"

A Public Discussion Paper on the Province's Energy Strategy

Nova Scotia's Energy Strategy

March, 2001

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Foreword

Nova Scotia is in the exciting early stages of becoming a major petroleum producer and exporter. Recent offshore developments resulted in large capital expenditures, new pipeline infrastructure, increased employment, and business spin-offs to both existing and new businesses throughout our province, and Canada. More projects lie ahead.

The new activities and relationships largely created by offshore petroleum are becoming part of our daily lives. Halifax is North America's newest energy capital, and locations such as Goldboro, Port Hawkesbury, Point Tupper, and others have the potential to attract major new industrial developments. Nova Scotians are already successfully competing in the international energy marketplace.

In a rapidly changing world, the energy industry and government must balance their social obligations with an environment that fosters commercial development. Trends to introduce market competitiveness into the generation, transmission and distribution of electricity, and the increase in concerns over environmental effects of the production and use of hydrocarbons on air quality and global warming must be strategically managed. Nova Scotia must also continue to ensure its business climate is competitive and attractive so that the energy sector significantly contributes to the province's future economic growth.

Energy heats our homes, powers our computers, lights our offices, and runs our many systems of transportation. Energy includes electricity, heating fuels, coal, gasoline and diesel, natural gas and oil, wood, hydro, solar, tidal and wind. The ways we extract, produce, transmit and consume energy have major implications for our economy, our standard of living, and our environment.

Against this background of challenge and opportunity, the Government of Nova Scotia is launching a major review of the role of energy in the province's future. Updating and revising Nova Scotia's energy strategy is a priority. It will include broad consultation with individual Nova Scotians, provincial organizations involved in the energy industry, as well as businesses from Nova Scotia, other provinces and countries.

Our strategy will consider longer-term challenges and provide a roadmap for government decision-making in this sector and provide businesses and entrepreneurs with a predictable policy plan that enables them to make investment decisions. It will build on our commitment to co-ordinate government's major policies, such as our fiscal management plan, our economic growth strategy ("Opportunities for Prosperity"), and our overall business plan.

Nova Scotia has the opportunity to become a world-class player in the energy industry. However, this will only be realized if appropriate actions are taken and sound policies put in place.

This discussion paper sets out for debate several major goals and principles for our energy sector. It outlines important issues and questions that need to be considered. It also contains backgrounders on topics relevant to the energy industry.

I encourage you to take time and think carefully about the many energy issues that will help shape our future, and to participate in the development of our new energy strategy.

John Hamm
Premier of Nova Scotia

Vision for the Energy Sector

In developing the revised energy strategy, we ask participants to help create a common vision for how they would like the energy industry to contribute to Nova Scotia's future. An example of how this vision could be expressed is:

"An energy strategy that balances economic growth, social goals and respect for the environment on behalf of the generations of today and tomorrow is essential for Nova Scotia to achieve its vision of becoming one of the best places in the world to live and to work."

Need for the Energy Strategy Review

Introduction

The Government of Nova Scotia decided a review of Nova Scotia's energy strategy is needed to ensure that the energy sector contributes to the province's long-term vision for its citizens, the economy, and all of Canada.

Developing a revised energy strategy presents an opportunity to prepare a long-term plan for an important part of the province's future. An innovative and progressive strategy will help expand our economy. Successfully implemented, it will help solve our serious financial situation and improve our ability to eliminate deficits, reduce debt and taxes, and provide additional funds for essential public services such as health, education and transportation. The revised energy strategy will also focus on protecting and improving our social and environmental values, while promoting our commitment to a positive and competitive business climate.

This is an exciting time for Nova Scotia to be pursuing new challenges and opportunities in the energy sector. Rapidly evolving technologies offer prospects for new and more efficient sources of energy and, hopefully, higher success from the exploration and development of existing natural resources.

Creating an energy strategy is an important goal for all citizens and businesses throughout Nova Scotia and a positive step along the road to achieving our vision.

Background

The energy sector is an important part of Nova Scotia's economy in terms of investment, trade, income, and employment. This sector is going through a tremendous transformation. In recent history the province has been primarily a consumer of energy products like electricity and heating fuels. We have also been increasing our consumption of transportation fuels like gasoline and diesel.

We are also becoming a major petroleum producer. The addition of natural gas to our traditional domestic energy sources of coal, wood, and hydro opens up new opportunities. These opportunities will continue to grow as new petroleum developments evolve and mature over the coming decades.

The offshore natural gas and oil industry started with the small but important Panuke-Cohasset offshore oil project in 1992. It rapidly accelerated when Sable natural gas started flowing in December 1999. In its first year of production, the Sable project exported almost $920 million of products; only seafood exports were higher. Natural gas will likely be our largest export in 2001.

Nova Scotia's energy sector was last reviewed in 1991. At that time, the Venture offshore gas project had been postponed indefinitely and a prime focus of that policy review was displacing imported foreign oil.

In comparing Nova Scotia's energy industry in 2001 to that of 1991, some of the most significant differences are:

- **The arrival of natural gas and oil to Nova Scotia.** The potential for long-term economic growth from offshore development, particularly natural gas, has increased dramatically. So have people's expectations. This is a major domestic and export opportunity that is changing the dynamics of the province's commercial and industrial sectors.

- **The changes in the way electrical utilities are regulated.** The 1992 privatization of Nova Scotia Power means the utility already operates with many marketplace disciplines. There is also a growing realization that changes in other parts of North America's electricity system, including an increase in competition, will have long-term implications for Nova Scotia's electrical industry.

- **The Kyoto Protocol of 1997.** This protocol established new targets for environmental management and emissions that contribute to climate change (referred to as greenhouse gas emissions). It also increased many people's awareness of environmental issues involving the energy industry.

- **The changes in Nova Scotia's coal industry.** Domestic coal is now less available and less used in generating electricity. Nevertheless, coal remains the least cost option today for most of Nova Scotia's electricity-generating plants.

- **The global landscape for energy has changed dramatically.** A decade of rapid world-wide economic growth has increased the demand for all forms of energy. Natural gas has become the preferred fuel for incremental electricity generation, particularly in the United States. Several factors have increased the attractiveness of Canada's energy industry and accelerated Nova Scotia's early growth. They include:
  - restrictions on new power generated from nuclear and coal;
  - the unfavourable environmental impacts of oil; and
  - the high costs and risks of finding new hydrocarbons in regions far distant from main markets.

Major Goals

There are many factors and viewpoints to be considered in developing the province's strategic goals and policy requirements for an industry as complex, and in such a state of change as the energy sector. Many people and organizations have an interest. Government must ask to what degree it wishes to be involved in governing the energy industry. What is the appropriate role of government in the energy industry? What policies and level of regulation are required?

In revising the energy strategy, the Government of Nova Scotia will take a long-term view of the industry and its need for a predictable and positive environment. The strategy will assess how the industry's main components might evolve provincially, regionally, nationally, and internationally. The issues require a balance of practicality and flexibility; they will have implications for decades.

The following strategic goals have been established for the province's energy sector. They will guide the process of analyzing choices and formulating policies.

1. **To create a world-class energy sector that achieves sustainable economic development, in balance with high social and environmental standards.**

2. **To optimize financial, economic, and social benefits in the province's rapidly expanding offshore energy sector.**

3. **To protect the quality of the province's environment and enhance the quality of life of its citizens.**

Values and Principles Guiding the Review

We need to begin by identifying the values and principles on which this sector will grow and prosper. These values will also affect the broader economic and social growth of Nova Scotia.

The following values and principles will guide strategic and policy choices.

1. **Public consultation, fairness, transparency, accountability and responsible regulatory practices will guide public sector energy policy-making.**

2. **To the extent possible, the supply, demand and price of energy products and services in Nova Scotia will be guided by policies that encourage consumer choice and competition.**

3. **The private sector is an essential partner in the management and growth of Nova Scotia's energy industry. It will be the source of most of the innovation and capital investment required to develop and expand this globally competitive sector.**

4. **Nova Scotians should be the primary beneficiaries of the industrial benefits and revenues generated by the province's energy resources. These benefits will be distributed as widely as possible throughout the province.**

5. **Potential environmental impacts will be taken into account in all energy policy-making decisions.**

6. **The energy needs of the Nova Scotia marketplace are best served by providing a diversity of reliable energy sources and pursuing efficiency and conservation initiatives.**

Issues and Questions

Rapid change is bringing challenges and opportunities to the energy industry in Nova Scotia and around the world. In the 1970s and 1980s, energy issues revolved around concerns over price and security of supply. During the 1990s, prices were more stable and public attention focused on sustainable development, energy efficiency, and industry restructuring. The 21st century began with sharp increases in energy prices, an economic slowdown, and evidence that restructuring in the electricity sector has not happened as smoothly as policy-makers had planned.

Nova Scotia's process of revising its long-term energy strategy and policy-making must take into account complex and inter-related issues. Some of these are outlined below. Backgrounders on many components and sectors of the energy industry are available in the appendix. These issues will be the focus of many of the discussions and presentations in the consultation. Research and analysis for the new energy strategy will also focus on these issues.

1. Energy and sustainable economic development

Nova Scotians need to ensure they have long-term reliable energy sources, at competitive prices, to support the following:

- sustainable economic development;
- personal requirements such as transportation, residential heating and electricity; and
- industrial usage.

  - How can we accomplish this?

2. Creating an attractive business climate for the energy sector

The energy industry should be the catalyst for additional economic developments in Nova Scotia. The start of offshore natural gas production and the completion of a pipeline to the United States, together with new exploration activities, have the potential to increase employment, contribute to the growth and profitability of existing and new businesses, and increase provincial government revenues.

  - How can Nova Scotia develop a business climate that is attractive and competitive for the participants and partners in the energy sector?

3. Future role for offshore oil and gas

The success in natural gas exploration and development offshore Nova Scotia, as well as anticipated future prospects offshore and onshore, has created new opportunities. Many choices will have to be made as Nova Scotia changes from primarily an energy-consuming society to one with a growing energy-producing sector.

  - What do Nova Scotians want to gain from the development of their offshore petroleum resources?

  - How can offshore development be consistent with other social, economic, and environmental priorities?

  - How can we ensure that a sufficient number of Nova Scotians will be qualified to find employment in the offshore petroleum industry?

4 Role and regulation of natural gas, compared to other energy sources

Nova Scotia became a major energy producer with the delivery of natural gas from the offshore to Maritimes and Northeast Pipeline Limited at Goldboro. For the first time in the province's history, natural gas will be available for residential and industrial use.

- What are the relative benefits of consuming natural gas domestically compared to exporting it? Should exporting natural gas be treated any differently than exporting oil, coal, or electricity?

- Should the regulatory systems of natural gas, oil, and electricity be based on similar policy principles?

5. How oil and gas co-exists with other economic and social sectors

We need to balance the offshore and onshore natural gas and oil industries with the fishing industry, local communities, and the environment.

- What actions are required to encourage and support the co-existence of the petroleum industry with other sectors of society?

6. Future of the electricity sector

Electricity is an essential commodity. A reliable supply of electricity at a competitive cost, produced in an environmentally responsible manner, is an important goal for Nova Scotia. Most of the province's electricity sector is investor-owned.

- Should Nova Scotia's electricity industry be restructured to provide more competition? If so, how?

7. Outlook for coal in Nova Scotia's energy future

Today Nova Scotia Power Inc. (NSPI) generates approximately 78 per cent of its electricity from four coal-fired generating plants. These plants typically produce the lowest-cost electricity in Nova Scotia. During the past five years, coal production in Nova Scotia has declined from about 2.7 million tonnes in 1995 to about 1.3 million tonnes in 2000. This has resulted in coal imports in excess of 1.5 million tonnes a year. The NSPI coal-fired generation plants have from 10 to 30 years remaining in their useful producing lives. Early retirement for these plants could result in accelerated write-downs of their capital value and increased costs to consumers.

- What role should coal play in electricity generation in Nova Scotia considering the following:
  - the economic impact of the coal industry?
  - the security of supply?
  - the cost of coal in the price of electricity?
  - environmental issues?

8. Environmental and climate change issues and the energy industry

Discovering, developing, generating, and consuming energy pose environmental challenges to the province, and Canada, in the short and long terms. The use of carbon-based energy products is becoming more broadly acknowledged as a major contributor to climate change, emphasizing the importance of the 1997 Kyoto Protocol proposal to reduce greenhouse gas (GHG) emissions.

In addition to climate change, there are issues related to air contaminants such as sulphur dioxide, nitrogen oxides, mercury, and particulates that are released at various stages of energy production and consumption.

- What climate change and environmental issues should be addressed in the energy strategy?

9. Options for energy efficiency, conservation, and demand-side management

To use less energy more efficiently, programs to improve performance and shift consumption from peak periods are usually a good investment for both the consumer and the producer. They also benefit the environment.

- What incentives can be created to improve efficiency and promote conservation in the production and consumption of electricity, heating fuels, and transportation fuels?

10. How to increase alternate energy sources: wind; solar; wood; etc.?

Renewable energy sources (hydro-electric, tidal power, solar energy, wind energy, wood and other biomass energy) are replenished through natural processes. With the exception of hydro-electric power, most renewable energy sources are a very small percentage of the energy mix. New technologies are reducing the costs and increasing the possibilities of renewable energy sources.

- How can we encourage increased amounts of "green power" and renewable energy sources in Nova Scotia?

11. What regulatory system is required for the energy industry?

The energy industry is broadly regulated. It has three levels of regulation: provincial, federal, and joint. The level and type depends upon the jurisdictional responsibilities and the nature of the energy product, the service, or impact. This multiplicity of regulators raises concerns about overlap, duplication, and the length of time for decision-making.

- How should the energy industry be regulated in order to protect competitiveness, fairness, and the environment, while balancing the province's economic and social needs?

- How important is it that our regulatory systems be supportive of the competitiveness of our business climate relative to other jurisdictions?

12. The co-ordination of energy issues by various levels of government

Federal-provincial-municipal co-operation across Canada is becoming more important for successful energy policy development. This co-operation will help to ensure that our energy industry remains internationally competitive. Several policy areas that require co-operative actions include:

- the development of regional energy markets and infrastructures;
- national targets for greenhouse gas (GHG) emissions; and
- the co-ordination of financial and regulatory actions.

- How should the province co-ordinate its energy policies to take these local, regional, national and international factors into account?

- What fiscal and taxation systems are required to ensure the competitiveness of Nova Scotia's energy sector?

13. Regional, national, and international considerations in the energy sector

Nova Scotia's energy industry is more interconnected with the regional, national, and international energy communities than ever before. Both the restructuring of the North American electricity sector and New Brunswick's recently announced plans to open its wholesale electricity market to competition and expand its linkages with the Northeastern United States grid, open up opportunities and raise implications for Nova Scotia. In addition, the natural gas pipeline from Nova Scotia through New Brunswick and into Maine has opened a new and significant transportation system for the province's offshore gas industry.

- What opportunities and challenges are presented to Nova Scotians by these inter-connections?

14. Staking a claim to the North American continental energy marketplace

The increased demand for energy in the United States and Canada gives Nova Scotia the opportunity to develop a comprehensive and forward-thinking energy strategy that can have a profound long-term impact on the economic and social development of our province.

- How can we as Nova Scotians increase our knowledge and awareness of the energy sector's potential, and improve our business skills and infrastructure to achieve the opportunities a new energy industry will offer?

Developing the Revised Strategy

A provincial task force of senior managers from the Department of Natural Resources and the Petroleum Directorate and external advisors will consult widely as it develops the revised strategy. It will examine the status of the energy sector through public workshops, presentations, submissions, research, interviews, and analysis. It will also assess the major trends in the provincial, national and international energy sectors. The objective is to make recommendations on the choices required to optimize the benefits to Nova Scotia over the long term.

There will be six public workshops during May and June. These workshops will be held in Yarmouth, Middleton, Truro, Port Hawkesbury, and the Cape Breton and Halifax regional municipalities. Each workshop will be co-chaired by a regional representative and a facilitator. The facilitator will co-chair all six meetings and work with the province's core energy team to report on the outcomes of these meetings.

In addition, the task force has established a Web site at **www.gov.ns.ca/energystrategy**. Individuals and organizations can also provide direct input into the strategy review process using the Internet by sending e-mail to **energystrategy@gov.ns.ca**. Information on energy matters and public submissions will also be posted regularly. Information that is proprietary or non-authorized will not be posted.

Submissions may also be made in writing to:

Nova Scotia Energy Strategy
c/o Nova Scotia Department of Natural Resources
Founders Square, 3rd Floor
1701 Hollis Street
P.O. Box 698
Halifax, NS
B3J 2T9

In addition to the public workshops, the task force will also solicit information and submissions from groups and organizations. The plan is to have as many Nova Scotians, and others interested in our energy industry, as possible, contribute and participate in the energy sector review in an open and effective manner.

A timetable of locations, dates, and procedures for the public workshops and other opportunities for public input will be published on the Web site and through other provincial government communications channels, such as Access Nova Scotia centers and regional and university libraries.

If you would like more information on the energy strategy, you may contact us toll-free at **1 800 704-5411**.

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1991 Nova Scotia Energy Policy

In 1991, Nova Scotia released an energy policy to address growing concerns in the rapidly evolving energy sector. These concerns included environmental protection and the instability of oil price and supply coupled with rising energy use, and a growing global trend towards government deregulation.

The policy focused on the efficient, sustainable and environmentally responsible development of indigenous resources in order to reduce our dependency on foreign energy sources (mainly oil) and ensure a long-term energy supply at stable prices for Nova Scotians.

Energy Goals

The energy policy focused on four main goals:

- Ensure the efficient extraction, conservation, and use of energy
- Maintain the quality of the environment
- Secure long-term energy supplies
- Maintain stable energy costs at affordable levels over the long term

Policy Areas

The province identified five policy areas and developed strategies to address each one:

1. **Energy Efficiency and Conservation**
   - Provide education, public information, and training to improve energy efficiency awareness by consumers
   - Set a good example by practising energy efficiency and conservation in government-funded facilities
   - Support demonstration projects
   - Encourage the use of standards for the design and construction of new buildings and appliances, and the upgrading of federal government guidelines for new vehicles
   - Assist individuals (especially low income) in controlling energy costs by providing technical advice and innovative financing of energy retrofits
   - Include energy efficiency in government policy
2. **Electricity**
   - Promote energy-efficient technologies and practices to limit growth in peak demand
   - Continue to rely on coal as the principal fuel in the short- and medium-terms; assess alternative supplies on a case-by-case basis
   - Base the maximum price to be paid by the utility for alternative energy sources on the full costs of generation by the utility
   - Consistently appy the established regulatory framework to all energy projects
   - Provide better public information on the regulatory proces and public input at regulatory proceedings

3. **Coal**
   - Reduce emissions from electricity generators
   - Help fund clean-coal demonstration projects and investigate funding strategies for research and development
   - Encourage coal exploration and development
   - Provide better public information

4. **Alternative Energy**
   - Evaluate the suitability, performance, and cost-effectiveness of alternative energy technologies
   - Implement cost-effective and technologically sound alternatives in government facilities
   - Assist in demonstration projects for under-used technologies
   - Provide better public information
   - Work to identify and reduce barriers to the use of alternative energy sources

5. **Oil and Gas**
   - Encourage offshore oil and gas exploration and development
   - Evaluate opportunities to use and market natural gas
   - Maintain environmental protection as a top priority
   - Ensure contingency measures to enhance security of supply
   - Monitor the downstream oil industry (gas and fuel oil marketing and pricing practices)
   - Increase public education and resource promotion efforts

Nova Scotia's Energy Use Today

Nova Scotia Energy Profile

In order to develop a revised energy strategy, it is important to have a clear picture of how, where, and what energy is used within the province. Information on Nova Scotia's energy consumption pattern over time and a comparison of our pattern to that of Canada, highlights some of the issues that need to be addressed in the strategy.

Primary Energy Demand

Primary energy demand is the total amount of energy used for all reasons. It includes energy used by the following:

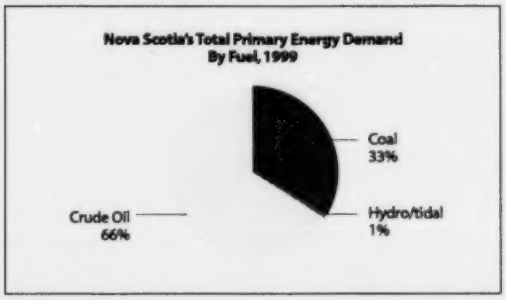
- the final consumer;
- during the transformation from one form to another (i.e., conversion of coal to electricity); and
- during transportation to markets (i.e., electricity lost in the transmission and distribution from the generating plant to consumers).

Primary energy demand in Nova Scotia in 1999 was provided mainly by crude oil and coal. The absence of any specific information on wood use in the province creates a gap in the Nova Scotia data on energy use. Consequently, the data understates energy use by the contribution made by wood and wood waste. In the residential sector, for example, wood use is believed to account for 10-20% of total energy use.

Nova Scotia's Total Primary Energy Demand By Fuel, 1999

Fuel	Petajoules*	Percent
Coal	88.4	33
Hydro/Tidal	3.8	1
Natural Gas	0.0	0
Oil	177.1	66
Total	269.4	100

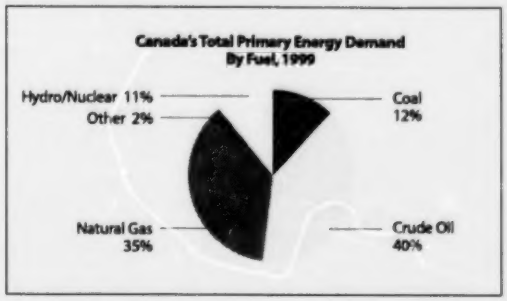
*Energy use is measured in petajoules: one petajoule would provide the annual energy requirements for space and hot water heating in Atlantic Canada for 8300 homes.



Canada has a more diverse supply of primary energy than Nova Scotia because of the substantial production of natural gas and electricity from hydro and nuclear energy sources, in addition to the reliance on crude oil and coal. Primary energy demand in Nova Scotia was stable from 1993 to 1996, but has grown approximately 11% in total during the last three years (1997-99). Canadian primary energy demand has grown steadily by a cumulative 15% during 1993-99.

Canada's Total Primary Energy Demand By Fuel, 1999

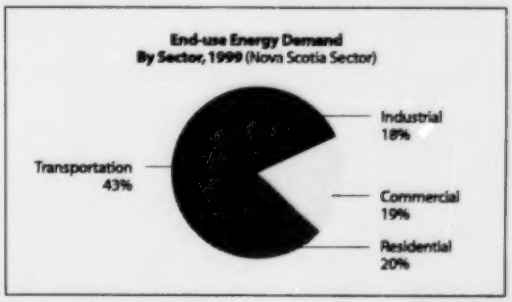
Fuel	Petajoules	Percent
Coal	1,283	12
Crude Oil	4,154	40
Natural Gas	3,645	35
Hydro/Nuclear	1,145	11
Other	232	2
Total	10,459	100



End-use Energy Demand By Sector, 1999

Nova Scotia

Sector	Petajoules	Percent
Industrial	32.2	18
Commercial	34.4	19
Residential	35.2	20
Transportation	77.2	43
Total	179.0	100



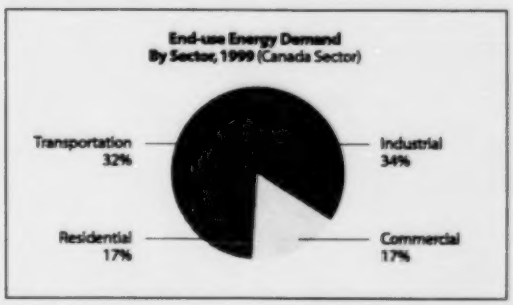
End-use Energy Demand

End-use energy demand refers to the energy used by final consumers in various sectors such as transportation, residential, commercial, and industrial; it excludes energy losses in the conversion from one energy form to another and in transporting energy from source to markets.

In Nova Scotia in 1999, transportation was the largest sector, with 43% of end-use energy demand. The balance is shared almost equally by the residential, commercial, and industrial sectors. For Canada as a whole, transportation (32%) and the industrial sector (34%) are the predominant users of energy, while the commercial (17%) and residential (17%) sectors have smaller energy demand.

Canada

Sector	Petajoules	Percent
Industrial	2,389	34
Commercial	1,190	17
Residential	1,228	17
Transportation	2,313	32
Total	7,124	100



Electricity Generation

Nova Scotia Power Inc. (NSPI), an investor-owned corporation, has 2183 MW of electricity-generating capacity, and an additional 25 MW is contracted from independent power producers. Hydro and tidal power account for 380 MW while the remainder of NSPI's capacity today is fired by fossil fuels -- coal, heavy fuel oil, natural gas, and light fuel oil. In 1997, 80% of NSPI's electricity generation was based on coal and 8% on oil. In 1999, oil-fired generation increased to 17% while coal-based electricity dropped to 71% of production. Since November 2000, NSPI has had access to natural gas at its Tufts Cove plant, giving the utility additional flexibility in the energy sources it uses for generating electricity.

Electricity Generating Capacity – Nova Scotia Power Inc. (2000)

Energy Source	Capacity (MW)	Percent
Coal	1,274	58
Heavy Fuel Oil /Natural Gas	350	16
Gas Turbine (Fuel Oil)	180	8
Hydro/Tidal	380	17
Total	2,183	100

Electricity Generation in Nova Scotia

	1999		1997	
Source	GWh	Percent	GWh	Percent
Coal	7,800	71	8,200	80
Oil	1,900	17	800	8
Hydro /Tidal	1,000	9	900	9
Purchased Power	400	4	300	3
Total	11,100	100	10,300	100

Recent Trends

After a noticeable decrease in the consumption of gasoline in 1991, growth resumed for the rest of the decade until 1999, when gasoline demand was almost back to 1979 levels. Obviously, the state of the provincial economy and price at the pump have a direct impact on gasoline use.

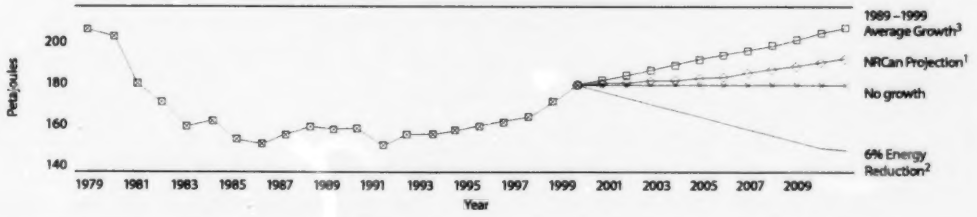
Residential fuel oil use has also responded to price by way of increased conservation measures and the substitution of wood, but the overall trend has been substantially downward. Demand for residential heating oil in 1999 is 25% less than in 1979. Electricity use has shown steady growth from 1979 to 1999 in both the residential sector (93% cumulative increase) and commercial sector (104% cumulative increase).

Offshore natural gas production commenced with the Sable Offshore Energy Inc. (SOEI) project in December 1999 and has now ramped up to approximately 500 million cubic feet per day. Natural gas production during the year 2000 has exceeded 120 billion cubic feet (bcf) in total and the value of SOEI products (sales gas and natural gas liquids) has exceeded $900 million.

The Maritimes and Northeast Pipeline (M&NP) from Goldboro to Massachusetts also went into service in December 1999. Subsequently, the Halifax and Saint John, New Brunswick laterals were brought into service in November and December 2000, respectively. Finally, with the expected building of Sempra Atlantic's natural gas distribution system this decade, many energy consumers in Nova Scotia will have access to one more energy source.

The following chart shows primary energy demand for Nova Scotia for the years 1979-1999 and a range of projected demands for primary energy for the years 2000-10. Any future management plan for greenhouse gas (GHG) emissions is likely to have significant implications for energy use in Nova Scotia, with our strong dependence on fossil fuels.

Nova Scotia Primary Energy Demand
(Historical and Alternative Projections)



Source 1979 – 1999 Historical Data: Statistics Canada

[1] Projected at Natural Resources Canada (NRCan) forecast growth rates.
[2] Targets a 6% reduction from 1990 levels by 2010.
[3] Projected at same rate of growth experienced from 1989 –1999.

Nova Scotian and Canadian Energy Prices

Whether it's the electricity used to light and heat our homes and businesses, gasoline for our cars, diesel for our trucks, or furnace oil and propane for space heating, the price of energy is a concern for all Nova Scotians. Although we enjoyed abnormally low energy prices during the 1990s, price spikes over the last year-and-a-half have had a significant impact on consumers, particularly those on low or fixed incomes.

One example is the price of furnace oil, which was fairly constant at 32¢/litre from 1989 until late 1999, when it rose quickly and peaked at 67¢/litre in December 2000, an increase of over 100%.

In order to address some of these issues and concerns, the provincial government established several programs, as follows:

- The Nova Scotia Department of Natural Resources maintains a website which contains regular updates of provincial and national gasoline, diesel, and furnace oil prices (see www.gov.ns.ca/natr/energy/fuelpricing.html).

- Service Nova Scotia and Municipal Relations made provision for a $50 fuel oil rebate for Nova Scotians below a certain income ceiling in fiscal 1999-2000 and 2000-2001.

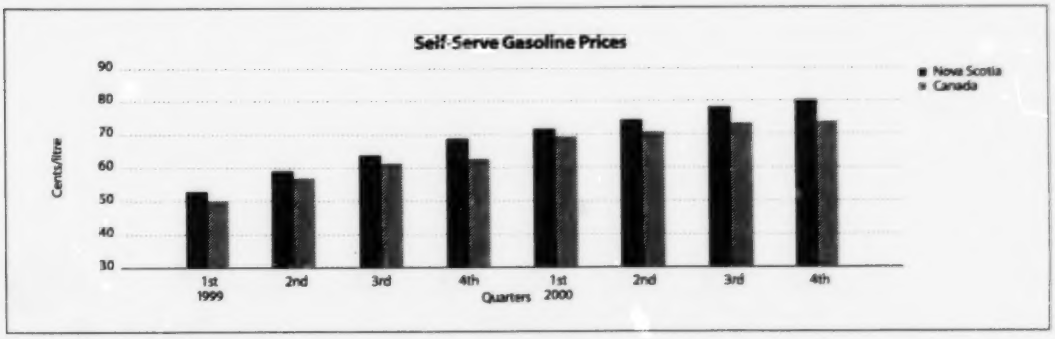
- Service Nova Scotia and Municipal Relations in cooperation with the Nova Scotia Department of Natural Resources established a toll-free line and Web site to provide personalized information on home improvement measures to reduce fuel consumption through the H.E.A.T. (Home Energy Action Tips) program (see www.gov.ns.ca/natr/energy/homeheat/).

The federal government has also provided Relief for Heating Expenses cheques of $125 per person or $250 per household to all those receiving the HST rebate.

The following tables and graphs illustrate just how much prices for various energy sources have moved over the past few years. They also show how energy prices in Nova Scotia compare to those of other Maritime provinces or the rest of Canada.

1. Gasoline, ¢/litre (regular self-serve, including taxes)

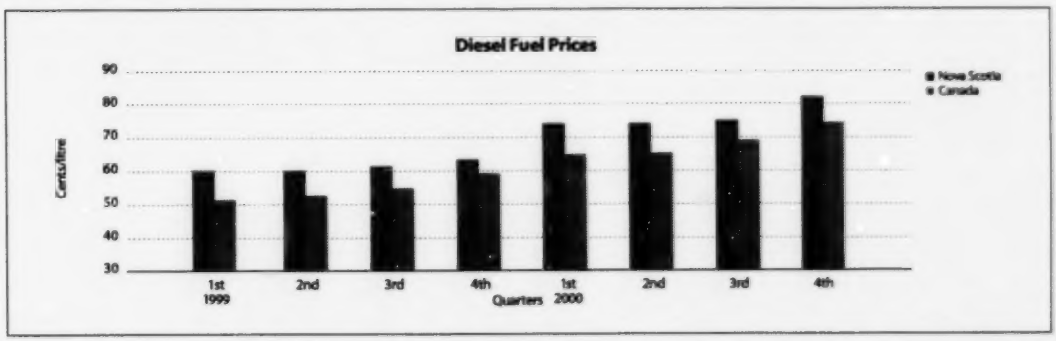
Year	1999				2000			
Quarters	1st	2nd	3rd	4th	1st	2nd	3rd	4th
Nova Scotia	52.9	58.9	64.3	68.0	72.4	75.3	77.3	79.6
Canada	50.0	56.4	61.3	62.3	67.8	71.1	73.6	73.8



Retail self-serve gasoline prices in Nova Scotia have risen by more than 50 per cent during 1999-2000. Although by historical standards Canadian rates are high, in terms of international pricing, they are among the lowest of major industrialized nations.

2. Diesel, ¢/litre (including taxes)

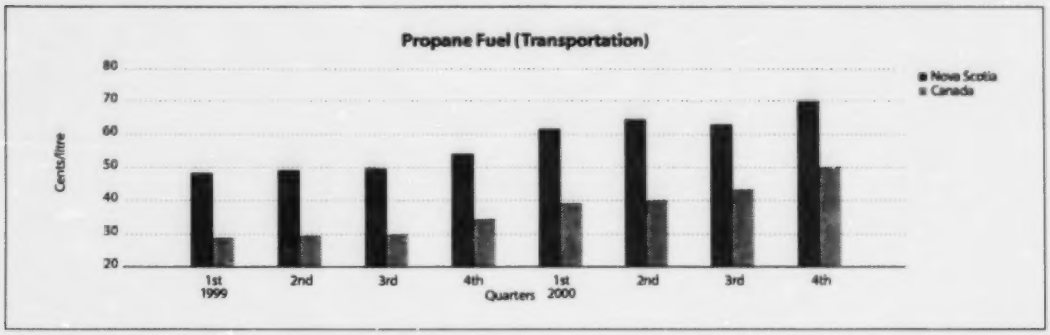
Year	1999				2000			
Quarters	1st	2nd	3rd	4th	1st	2nd	3rd	4th
Nova Scotia	58.9	59.2	61.1	63.0	74.1	74.5	75.5	82.5
Canada	51.6	51.8	54.0	58.4	65.1	65.1	68.2	74.4



Diesel fuel prices increased by over 40 per cent during 1999-2000. Although diesel fuel is chemically similar to furnace oil, the increase differs because of the tax structure applied to diesel fuel and not to furnace oil.

3. Propane, ¢/litre (including taxes)

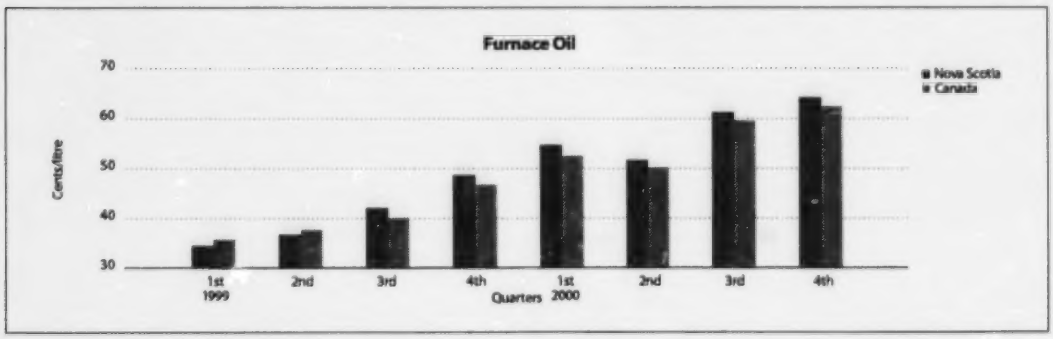
Year	1999				2000			
Quarters	1st	2nd	3rd	4th	1st	2nd	3rd	4th
Nova Scotia	46.8	47.7	49.2	54.5	61.5	64.1	62.9	69.8
Canada	28.3	28.8	30.1	34.5	38.7	40.2	43.7	49.4



Propane is used sparingly in Nova Scotia as a transportation fuel. Compared to gasoline or diesel fuel, propane contains considerably less energy per litre. Although it attracts tax at about half the litre rate of the other fuels, it remains a premium-priced transportation fuel.

4. Furnace Oil, ¢/litre (including taxes)

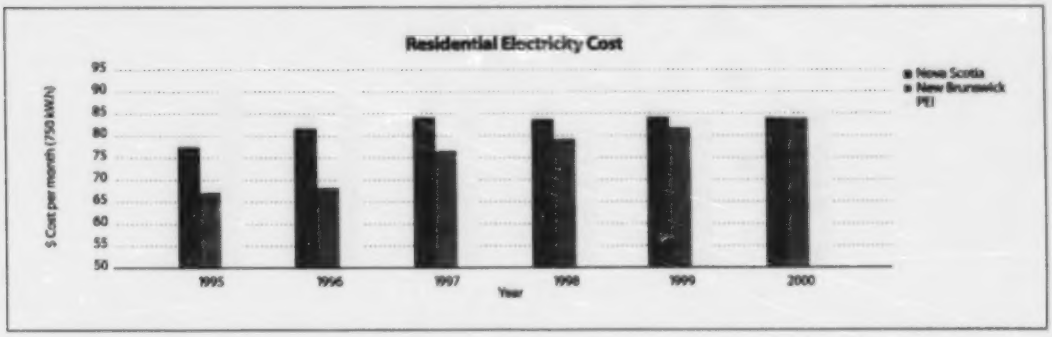
Year	1999				2000			
Quarters	1st	2nd	3rd	4th	1st	2nd	3rd	4th
Nova Scotia	33.7	35.9	41.6	47.2	55.3	51.1	61.1	64.6
Canada	35.6	37.3	39.6	45.1	52.3	49.8	58.8	62.1



The price of furnace oil in Nova Scotia was fairly constant at 32¢/litre from 1989 until late 1999 when it rose quickly and peaked at 67¢/litre in December 2000. This marked an increase in price for this fuel of over 100 per cent. Although this trend was consistent across the country, Nova Scotia felt the impact more significantly, due to a greater reliance on this fuel than many other provinces.

5. Electricity (750 kwh/mo.)

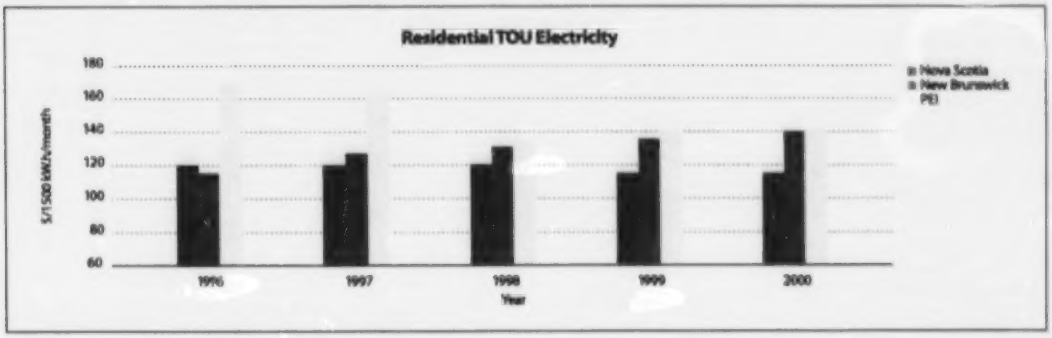
Year	1995	1996	1997	1998	1999	2000
Nova Scotia	$77	$81	$84	$84	$84	$84
New Brunswick	$67	$68	$76	$79	$82	$84
PEI	$92	$90	$88	$81	$84	$86



The residential price for electricity in Nova Scotia has remained relatively flat for the past five years, while neighbouring electric utilities in New Brunswick and Prince Edward Island have shown significant increases and decreases. Privatization of Nova Scotia Power, and the changes instituted since then, may have enhanced their ability to remain competitive with other jurisdictions and to stave off major price increases.

6. Electricity Time-of-Use (TOU) rates (1500 kWh/mo.)

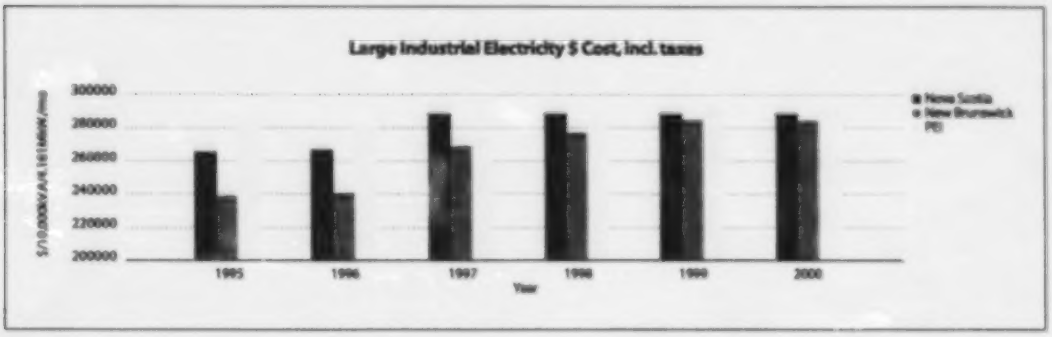
Year	1996	1997	1998	1999	2000
Nova Scotia	$118	$118	$118	$114	$114
New Brunswick	$113	$126	$130	$135	$139
PEI	$167	$163	$133	$138	$142



As part of an effort to ensure that their product is competitive with other fuels, Nova Scotia Power developed a time-of-use rate that rewards residential consumers using electricity off-peak, both daily and seasonally. Consumers availing themselves of this rate class can save up to 35 per cent or more on energy costs.

7. Large Industrial Electricity Cost (10,000 kVA / 4,161,000 kWh/mo.)

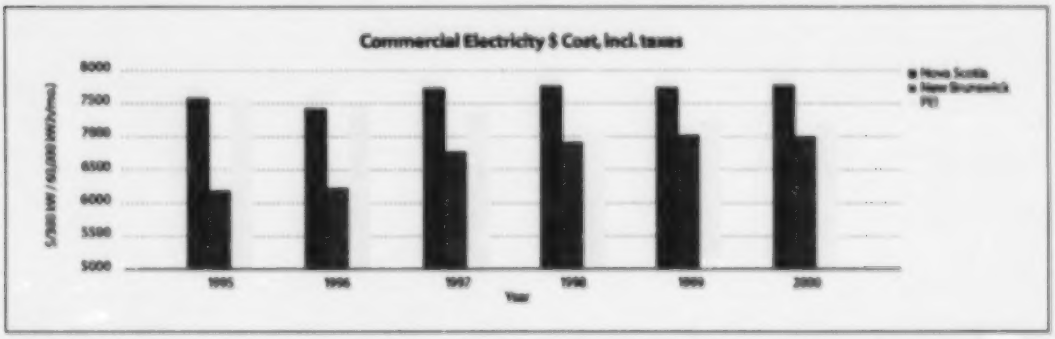
Year	1995	1996	1997	1998	1999	2000
Nova Scotia	$264,901	$266,399	$286,317	$286,317	$286,317	$286,317
New Brunswick	$237,721	$242,490	$268,187	$275,840	$283,977	$283,977
PEI	$284,603	$278,893	$273,271	$282,402	$290,723	$290,723



As with other Nova Scotia Power rate classes, the past few years have shown relatively flat pricing for the large industrial sector. During the same period, New Brunswick Power has been forced to raise their large industrial rates nearly 20 per cent.

8. Commercial Electricity Costs (300 kW / 60,000 kWh/mo.)

Year	1995	1996	1997	1998	1999	2000
Nova Scotia	$7,608	$7,390	$7,711	$7,711	$7,711	$7,711
New Brunswick	$6,183	$6,260	$6,803	$6,888	$7,005	$7,005
PEI	$7,616	$7,465	$7,319	$7,050	$7,172	$7,172



During the past six years, Nova Scotia Power's commercial rate class has also shown little change, while neighbouring utilities have been volatile. In particular, New Brunswick Power increased rates in this sector by more than 13 per cent during the same period.

Residential Natural Gas Costs* in Nova Scotia

	Heating Oil $/GJ	Gas Commodity Cost $/GJ	Distribution Rate $/GJ	Delivered Cost of Gas $/GJ
January 2000	11.14	4.06	6.52	10.58
February 2000	12.17	5.12	6.44	11.56
March 2000	11.91	4.11	6.94	11.05
April 2000	11.91	4.38	6.93	11.31
May 2000	11.39	4.74	6.08	10.82
June 2000	11.91	6.44	4.87	11.31
July 2000	12.17	6.37	5.19	11.56
August 2000	12.43	5.56	6.25	11.81
September 2000	13.47	6.60	6.20	12.80
October 2000	14.76	7.96	6.06	14.02
November 2000	14.50	7.06	6.72	13.78
December 2000	15.02	9.63	4.64	14.27
January 2001	13.98	16.44	0	16.44
February 2001	12.95	9.72	2.58	12.30

* As calculated using Sempra Atlantic's proposed rate plan.

The delivered cost of natural gas through the Sempra Atlantic Gas distribution system is divided into two components – the cost of gas commodity and the delivery charge. The delivery charge for residential and small commercial users is adjusted monthly so that the overall delivered cost of gas is generally pegged at no greater than 95 per cent of the price of heating oil.

Because there is a cap ($6.94/GJ in 2001) as well as a floor ($0.00/GJ proposed) on the distribution rate, there can be circumstances where the discount for natural gas to homeowners exceeds 5 per cent (March 2000), and other situations where gas is even more expensive than fuel oil (January 2001).

Sempra's roll-out plan for gas distribution in Nova Scotia and its forecast of penetration rates is based on the historical spread between natural gas and heating oil prices.

Between October 2000 and February 2001, the cost of gas commodity was higher than ever, which would have made it extremely difficult for gas to compete with heating oil in the conversion market.

Offshore Oil and Gas Industry Profile

Background and History

Nova Scotia's offshore oil and gas industry began in 1967 when Mobil Oil drilled the first well in offshore Nova Scotia. This well investigated geological features that were believed to exist in the offshore as a result of geoscientists' work on the area dating back to the late 1950s. In 1969, Shell discovered gas in its Onondaga gas field. In 1971, Mobil discovered oil and gas on Sable Island. This was followed two years later by Mobil's discovery of the Cohasset oil field, the first of two fields comprising the Cohasset-Panuke Oil Project (COPAN), Canada's first offshore project. In 1979 Mobil discovered the Venture gas field, the largest of the six-field Sable Offshore Energy Project (SOEP). To date, 175 wells have been drilled and 22 significant discoveries have been made in the Nova Scotia offshore.

Economic Importance

Production from the COPAN oil project began in 1992 as a joint venture between the Crown-owned Nova Scotia Resources Limited and Lasmo PLC, a British oil and gas company. Lasmo later sold its interest and operator responsibilities to PanCanadian. COPAN produced just over 44 million barrels of oil with total operating and capital expenditures of approximately $1.3 billion, before it reached its economic limit in 1999.

Development of the Venture gas field was delayed due to a sharp decline in energy prices in the late 1980s. In a far-sighted decision in 1994, Mobil Oil joined with Shell Canada and other partners to pool six offshore discoveries into sufficient reserves to justify a $2 billion development project, and a $1 billion pipeline to Massachusetts.

The economic decision to proceed with the Sable Offshore Energy Project was based on an estimated 3.5 trillion cubic feet of gas from the Thebaud, Venture, North Triumph, Alma, Glenelg, and South Venture gas fields. Production began on December 31, 1999 and by early 2001 reached roughly 500 million cubic feet a day. In its first year of operation, SOEP produced an estimated $920 million of export revenues, second only to provincial seafood exports. This production is equal to approximately 25 per cent of the annual natural gas consumption in New England.

As of January 2001, the announced proven reserves on the Scotian Shelf, mainly in the Sable Island area, amount to 6.3 trillion cubic feet of gas and 220 million barrels of crude oil and condensate. However, based upon seismic evidence, exploration drilling, and known geology, Nova Scotia's offshore resource potential is likely in excess of 20 trillion cubic feet of gas. More recent seismic evidence, exploration drilling, new geological theories, and a focus on the deep-water areas beyond Sable Island, have led industry to believe that the potential may be closer to 40 trillion cubic feet. Some investment analysts suggest the ultimate potential could be in excess of 50 trillion cubic feet. Those numbers would meet the demand for natural gas in the Maritimes and New England, at current levels, for many decades.

Efforts to "prove up" these estimates are now under way. Interest in Nova Scotia's offshore has intensified in recent years with a significant increase in exploration commitments. The total work commitments in the next five years, on the 50 offshore license areas, now exceed $1.03 billion.

Role in Energy Mix

A significant part of the Sable production is under contract to large energy consumers in the Maritimes. But high natural gas prices in the United

States have recently made it more economical for the large Maritime gas consumers to sell contracted gas in the U.S., while continuing to burn fuel oil in Nova Scotia.

Nova Scotia is expected to burn approximately 80 million cubic feet of natural gas a day by the end of the decade, after the Sempra natural gas distribution system is in place. That is 15 per cent of the total production capacity of the existing Sable Offshore Energy Project. Nova Scotia also has an opportunity to develop new industries and processes that could result in further consumption of natural gas in the province. Given production projections in excess of two billion cubic feet a day, it is likely that the exporting of Nova Scotia's natural gas will continue to be the key market driver for the exploration and development of our offshore natural gas.

Although natural gas has been the dominant hydrocarbon discovered offshore Nova Scotia, oil is also present. It may be a significant factor in areas that have been explored less intensively, such as the deep waters beyond the edge of the Scotian Shelf.

Based upon the expected exploration activity and past discovery rates, the Nova Scotia Petroleum Directorate believes that as many as six offshore energy projects will be in various stages of development by 2010-15.

Future Outlook

The next major offshore natural gas project is the Deep Panuke project, located approximately 250 kilometers southeast of Halifax. This project is based upon a natural gas discovery in a different geological structure underneath the Panuke oil field. Pan Canadian announced on February 22, 2001 that it will proceed with this project on the basis of a production of approximately 400 million cubic feet a day of natural gas. The project will cost an estimated $1.0 billion to develop. First production is targeted for early 2005.

In fact, PanCanadian is looking at drilling as many as 15 offshore wells over the next four years. PanCanadian as operator with partners Murphy Oil, Norsk-Hydro and Marathon, is the largest landholder offshore Nova Scotia, with 1.77 million hectares under license. To put that into context, PanCanadian has more than one-quarter of the offshore land currently under active license. The company will drill four wells in 2001, not including activity associated with its Deep Panuke project.

Mobil is looking at as many as seven more wells over the next four years in the area around Sable. It is looking at using the drilling rig currently under contract to Mobil, during periods between the scheduled drilling of the Tier II SOEP wells. Marathon hopes to begin deep-water drilling in 2001. Kerr-McGee has called for proposals on plans to begin deep-water drilling on two of its blocks in the spring of 2002.

Other companies are working on drilling plans for the next few years: Shell, Chevron and partner Petro-Canada, and Hunt and partner TotalFina Elf. These companies have significant commitments that are expected to translate into major drilling programs in the next two to five years. In addition, the size of the recent BP/Anadarko commitment means this partnership will likely drill two to three wells by the middle of the decade.

Exploration agreements in the Laurentian Subbasin between Newfoundland and Nova Scotia that are currently inactive will likely be reactivated in the near future. An arbitration tribunal is expected to rule on the boundary dispute between the two provinces in the spring of 2001. A ruling would set the stage for renewed exploration in this promising area, likely in 2002-03.

Environmental Issues

Natural gas is a relatively "clean" fuel from an environmental context. There are fewer pollutants from burning natural gas than from burning coal or oil. Gas development projects pose less danger to the environment than oil developments because gas would quickly dissipate into the atmosphere should a spill occur. Also, with gas

turbine technology, gas-fired electricity generators can be located closer to the source of electricity consumption, reducing transmission costs. These reasons have made natural gas the favoured fuel for much of the new electrical generating capacity in the past decade.

Regulatory Framework

Offshore petroleum development and production is subject to joint federal-provincial regulation through the Canada-Nova Scotia Offshore Petroleum Board (CNSOPB). This independent agency's regulatory functions include:

- ensuring safe working conditions;
- granting exploration permits and licenses;
- facilities construction and production;
- protecting the environment; and
- monitoring industrial benefits and employment.

Policy matters and fundamental decisions are handled jointly between the ministers responsible for Natural Resources Canada and the Nova Scotia Petroleum Directorate. The Petroleum Directorate is responsible for the Petroleum Resources Act and co-ordinates policy-making and other petroleum activities on behalf of the government of Nova Scotia.

Onshore petroleum resources are owned by the province and regulated by the Petroleum Directorate. When orshore exploration and production involve tle use of Crown land, they fall under the Crown Lards Act. The Department of Labour and the Environment regulates all matters related to occupatioral health and safety. In addition, the Nova Scotia Utility and Review Board regulates gas distribition and sales in the province, i.e., the Sempra Atlantic Gas distribution system network. It is responsble for pipeline construction and operation, setting pipeline rates, tolls, charges, and terms of service, and issuing gas distribution franchises and gas saes licenses. The marketing and sales of natural gas commodity, however, is subject only to competitive market forces.

There is some regulatory overlap between the offshore and onshore industries with respect to activities such as offshore developments integrated with onshore processing facilities and offshore and inter-provincial pipelines, for example. With respect to the latter, the National Energy Board is the primary regulator.

Sable Offshore Energy Project

Background

The Sable Offshore Energy Project (SOEP) encompasses one of the largest known natural gas deposits remaining to be developed in North America. The $3 billion project involves the development of six major natural gas fields that lie 10 to 40 kilometers (6 to 25 miles) north of the edge of the Scotian Shelf.

Phase One of the project was completed at a cost of about $2 billion, encompassing the development costs of the gas fields (Thebaud, North Triumph, and Venture), subsea pipeline, the gas plant at Goldboro, the natural gas liquids pipeline to Point Tupper, and the fractionation plant at Point Tupper.

In 2001, Sable Offshore Energy Inc. (SOEI) will begin to proceed with Phase Two of the project, which is estimated to cost $1 billion. Engineering for the Alma, Glenelg, and South Venture gas fields will begin in the spring of 2001 and production is expected to commence sometime between 2003 and 2007.

Commitment to Nova Scotia

SOEP is forecast to produce a 25-year supply of natural gas and plans to deliver 530,000 million British thermal units of market-quality sales gas per day from onshore processing facilities in eastern Nova Scotia.

Natural gas from SOEP began to flow in December 1999, 30 years after gas was first discovered off the coast of Nova Scotia.

Markets for the natural gas include Nova Scotia, New Brunswick, and New England. The Sable fields are also producing natural gas liquids, which are being processed at a liquids-handling facility in Point Tupper.

Benefits to Nova Scotia

SOEP means many benefits for Nova Scotians, including:

- a new industry;
- increased demand for local supplies and services;
- jobs for Nova Scotians;
- access to a clean, economical form of energy;
- royalty revenue for the province; and
- infrastructure for future projects.

The latest report on employment levels for SOEP show that during the third quarter of 2000, 53.3 per cent of the workforce was Nova Scotian. Investment in Nova Scotia grew to 71.2 per cent during the same period, with total expenditures reaching over three quarters of a billion dollars ($761.2 million).

Ownership

The shareholders of SOEP are Mobil Oil Canada Properties (50.8 per cent), Shell Canada Limited (31.3 per cent), Imperial Oil Resources (9.0 per cent), Nova Scotia Resources Limited (8.4 per cent), and Mosbacher Operating Limited (0.5 per cent). The assets of Nova Scotia Resources Limited are in the process of being sold.

The associated pipeline project is the Maritimes and Northeast Pipeline (M&NP) project. M&NP is 37.5 per cent owned by Duke Capital Corporation, 37.5 per cent by Westcoast Energy Inc., 12.5 per cent by Exxon Mobil Canada Products Ltd., and 12.5 per cent by Nova Scotia Power Holdings Inc.

Offshore and Onshore

SOEP includes both offshore and onshore facilities.

The offshore side includes a central processing facility near Sable Island which will eventually be connected to six production platforms. Three are currently connected and producing gas.

A subsea pipeline is transporting the gas to a processing plant in Goldboro, Guysborough County. This is where the onshore portion of the project begins. At the gas plant, natural gas liquids are separated from the natural gas. The liquids travel by underground pipeline to a liquids processing plant in Point Tupper. The sales gas travels by M&NP pipeline from Goldboro to markets in Nova Scotia, New Brunswick, and New England.

Electricity Industry Profile

Background

A secure supply of reasonably priced electricity is essential to our way of life and our ability to provide economic growth and prosperity for our citizens. Around the world, and in particular in the United States, the electricity industry is going through a period of major changes. Governments mandate some of these changes, while others are the result of environmental concerns for the way we generate and distribute electricity. All of these issues need to be carefully considered in providing a strategy for the future of electricity in Nova Scotia.

History

Historically, Nova Scotia's electrical generation was built on the basis of providing local or regional power distribution throughout the whole province. By the mid-1960s, the privately owned Nova Scotia Light and Power was the dominant utility in the province. As a matter of government policy in the 1970s, most of the private utilities were consolidated into one entity – the Crown-owned Nova Scotia Power Corporation. This consolidation was designed to encourage the development of a transmission grid and enable the financing and construction of large coal-fired generation plants in Pictou County and Cape Breton. In 1992, the government decided that electrical generation, transmission, and distribution could be better managed in the private sector. It sold its shares of Nova Scotia Power to investors.

Economic Importance

Nova Scotia Power Inc. (NSPI), through its parent company, Emera, is one of Nova Scotia's largest publicly traded corporations. The following consolidated financial information is as of December 31, 2000:

- revenues of $896.5 million, net earnings of $104.4 million, and assets of $2,951.0 million
- 1785 employees and 440,000 customers
- it paid $11.0 million in municipal grants in lieu of taxes, and $7.2 million of provincial capital taxes, and had corporate income tax liabilities of $12.5 million
- net capital expenditures were $121.4 million in 2000

Role in Energy Mix

Although privatized, NSPI continues to be a vertically integrated monopoly and remains subject to regulation by the Nova Scotia Utility and Review Board.

As the predominant electricity supplier in Nova Scotia, NSPI owns and operates 97 per cent of the generation, 99 per cent of the transmission, and 95 per cent of the distribution systems in the province. The remaining portion of electricity distribution in Nova Scotia is owned and operated by six municipal utilities: Canso, Antigonish, Berwick, Riverport, Mahone Bay, and Lunenburg.

The company's generation capacity is 2,183 megawatts (MW). This includes 1,274 MW of coal-fired thermal generation, 350 MW of natural gas/heavy fuel oil-fired thermal generation, 180 MW of gas turbine generation (fuel oil-fired), and 381

MW of hydroelectric generation. In comparison, independent power producers operate a capacity of 25 MW, which is almost entirely provided by one biomass-based co-generation facility located on Nova Scotia's South Shore. In addition, a number of Nova Scotian companies generate part of the electricity they consume.

NSPI produces (based on 2000 figures) approximately 78 per cent of its electricity from its coal-fired plants, 12 per cent from its oil-fired plants, and 8 per cent from its hydro plants. About half the coal and all the fuel oil are imported. The remainder of the coal comes from domestic mining.

It operates a 300 MW-capacity, high-voltage transmission inter-connection with New Brunswick Power. This is currently the only inter-connection with the North American bulk power system.

Unique Properties of Electricity

Electricity is a commodity that must be produced and delivered on demand, since it is not feasible to store it in any significant quantities without major pumped storage hydro facilities. This real-time commodity requires Nova Scotia electricity providers to ensure that there is adequate generation, transmission, and distribution to service their customers' peak power demands. This results in under-utilization during non-peak periods. NSPI is required to maintain a generation reserve margin of at least 20 per cent, which includes their interruptible load of 16 per cent.

Electricity Sector Facilities in other provinces

It is important to note that Nova Scotia is one of only three provinces in Canada that produces the majority of its electricity needs from carbon-based fossil fuels: the other two are Saskatchewan and Alberta.

British Columbia, Manitoba, Quebec, and Newfoundland generate electricity mainly by large-scale hydro-electric systems. Ontario, New Brunswick, and Prince Edward Island rely on a mix of nuclear, coal and oil-fired thermal generation. Legislation in Nova Scotia forbids the use of nuclear-powered electricity generation facilities in the province.

Environmental Issues

The production of electricity in Nova Scotia will likely face growing pressure from environmental regulation and control over the next several decades. Canada has signed, but not ratified, the Kyoto Protocol, which is aimed at reducing carbon dioxide and other emissions implicated in causing global climate change. This protocol, if ratified, will require large reductions in the use of fossil fuel around the world if its targets are to be met.

Reductions in the use of high carbon fuels such as coal and oil will come from switching to lower-carbon fuels such as natural gas, substitution with hydro electricity, or the use of renewables such as biomass, wind, and solar energy. Cleaner coal-burning technologies and new technologies such as fuel cells are also expected to play a part in reducing emissions.

In addition to climate change considerations, other environmental air quality concerns with sulphur, mercury, nitrogen oxides, and particulates play an important role in future electricity generation. Reductions in the emissions of these pollutants to protect human health and our environment will have a significant impact on fuel choice during the next 10 to 20 years. As a result, costs for switching fuels or implementing new technologies may well provide upward pressure on electricity prices to consumers.

Regulatory Framework in Nova Scotia

The Nova Scotia Utility and Review Board is required to approve rate structure and applications for additional facilities. The rate structure is designed to allow NSPI some flexibility in achieving results while ensuring the company does not achieve an excessive rate of return on its equity. The long-term bondholders are guaranteed the return of original principal by the company and to earn a

rate of return on their investment. The present allowable range for the rate of return on equity for shareholders is between 10.5 and 11 per cent.

Regulatory Requirements Elsewhere

Restructuring of the electric utility industry has received much attention in recent years, especially because of consumer benefits derived from the deregulation of the telephone industry. The advent of highly efficient and relatively inexpensive (from a capital cost standpoint) natural-gas-fired electric generation systems has led to consumer and business demands for competition in the electricity sector. A growing number of jurisdictions share the view that electricity prices should be determined primarily by the market rather than regulation, and that competition should lead to improved efficiencies and increased consumer choices.

In the United States, the federal government introduced the Energy Policy Act of 1992 and a series of Federal Energy Regulatory Commission orders to force utilities to share transmission facilities in a fair and equitable manner. It also mandated competition for interstate transactions. As of October 2000, the District of Columbia and 25 states have adopted restructuring legislation or regulatory orders. Almost all other states are contemplating it at some level. However, the recent failure of the regulatory changes in California has caused many jurisdictions to take a second look at their plans for retail electrical competition.

In Canada, the provinces have jurisdiction over intra-provincial transmission networks, while the National Energy Board has jurisdiction over electricity issues related to electricity exports and of international and designated inter-provincial power lines. The provinces have been attempting to come to an agreement on the Energy Chapter for the Agreement on Internal Trade. The Chapter contains provisions for cross-territorial transmission and the implementation of North American reliability standards.

Ontario and Alberta have taken the lead in moving forward with comprehensive electricity restructuring to allow retail competition. Both are expected to implement the next phases of market reforms during 2001. However, since Alberta introduced retail competition to its marketplace on January 1, 2001, they have also introduced rate subsidies to protect consumers from much of the increase in the cost of electricity.

New Brunswick has just announced its plan to restructure its electricity market to facilitate wholesale competition and retail competition for its large industrial customers by April 2003. In New Brunswick, a market design committee will address these developments. The committee will report to government by April 2002.

British Columbia and Quebec have taken steps to satisfy the requirements of the Federal Energy Regulatory Commission orders, which are intended to provide open access to their transmission facilities to any entity that desires to service their domestic wholesale customers.

Globally, a number of countries have introduced market reforms to their respective electricity markets, including the European Union countries, Australia, New Zealand, much of South America, and a number of Asian countries. Argentina and the State of Victoria in Australia have been cited as two jurisdictions where restructuring has been successful.

Efficiency and Competitiveness of NSPI

Since privatization in 1992, Nova Scotia Power has continuously made improvements to become more competitive. This has been done with the expectation that in the longer term they may be required to compete with natural gas and other electricity service providers in the bulk power system of the Northeastern region of North America.

These efforts to remain competitive partly explain why NSPI has only applied for one minor rate increase since it became a private company. The last rate increase occurred in 1995.

In recent years, NSPI has introduced new rate options, i.e., a time-of-day rate option for residential customers and real-time pricing options for its larger customers. These new options are to encourage consumers to shift a portion of their electricity use to times that do not coincide with NSPI's system peak. This results in a more optimal use of NSPI's existing system and delays the requirement for additional capacity.

Because of these initiatives, NSPI's rates for Nova Scotia's largest customers are among the lowest available on the northeastern United States grid. In addition, NSPI's residential customers who take service under the new time-of-day rate option also enjoy one of the lowest residential rates in the northeastern region. NSPI has recently announced its intention to offer similar rate options to all of its customer rate classes.

In addition to providing competitively priced power, NSPI has exhibited a solid record with respect to system reliability. System outages have been maintained well within industry standards.

Coal Industry Profile

Background

Nova Scotia is blessed with abundant coal resources and, until recently, has been able to supply all of its coal requirements. In recent years, however, technical difficulties in mining these resources have led Nova Scotia Power Inc. (NSPI) to import coal to meet a portion of their needs.

History

In recent years, the majority of our coal has come from the Cape Breton Development Corporation's underground mines (most recently the Prince and Phalen Collieries). Lesser amounts have been supplied by surface coal mining operations, mainly in the Pictou, Inverness, and Sydney coalfields.

During the 1980s, Nova Scotia actually exported a significant amount of coal.

In 1998, however, coal imports became a significant factor, when problems with mining in the Phalen Colliery led to extended periods of non-production and eventually the shut-down of the mine. These difficulties were compounded by production problems in the Prince Colliery. The resulting shortfall in domestic production was made up by imports of about 1.5 million tonnes in both 1998 and 1999.

Economic Importance

The coal mining industry is a major component of the province's mining sector. Over the past five years, it has had an average value of about $150 million annually, despite a decline in production from more than 4 million tonnes in 1992 to about 1.3 million tonnes in 2000 (Figure 1).

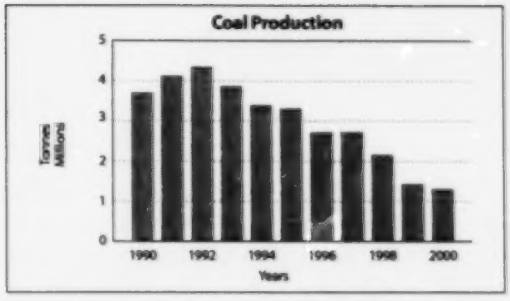


Figure 1 – Coal production in Nova Scotia in the past decade

The industry still provides more than 1000 direct jobs (Figure 2) and as many as 700 indirect jobs.

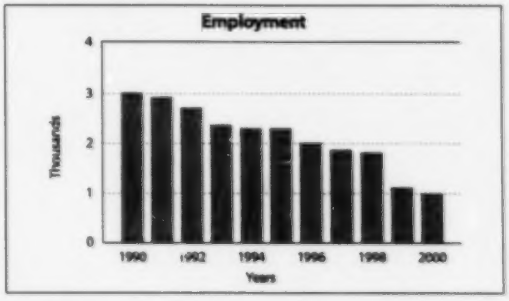


Figure 2 – Direct employment in coal mining in Nova Scotia in the past decade

Coal mining currently provides about $360,000 in royalties to the province (Figure 3) and generates approximately $15 to $20 million in business, service, and supply to the coal industry.

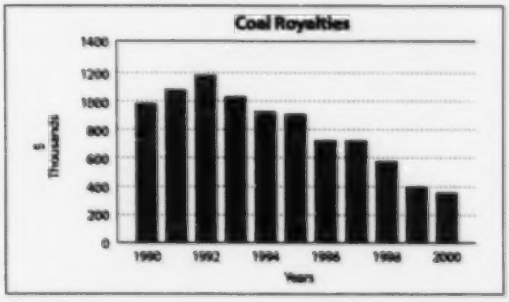


Figure 3 – Nova Scotia coal royalties in the past decade

Role in Energy Mix

Nova Scotia depends on coal as fuel for approximately 78 per cent of our electricity generation. Nova Scotia Power Inc. (NSPI) currently has the capacity to generate 1,274 MW from coal-fired generators in four locations that collectively represent an annual demand for about 2.8 million tonnes of coal.

The recent announcement by the federal government that it intends to privatize the DEVCO operations, and the closure in 1999 of the Phalen Mine, has generated uncertainty about the continuing availability of indigenous coal. The Prince Mine can continue to contribute up to 1.1 million tonnes annually. If a developer is found that can mine the Donkin resource block economically, there is potential for substantial additional supply.

The demand for coal at NSPI in the face of difficulties in the major underground collieries also presents market opportunities for independent surface mine operators. In the recent past, surface coal mining has amounted to about 400,000 tonnes annually. This level could be maintained for the near term but probably not on a sustainable basis. At the same time, small coal mining operations have successfully undertaken reclamation mining, where removal of near-surface resources provides an opportunity to clean up and reclaim sites previously disturbed by coal mining.

The expected remaining life span of the NSPI generators ranges from about 10 to 30 years and, therefore, any move to replace them in the near term could involve significant associated stranded costs. There is potential to replace at least some of the coal-fired generation with natural gas in the near term. Units at Point Tupper and Trenton could be repowered to burn natural gas and there may be potential for the construction of new co-generation plants (fueled by gas) by the utility or large-volume industrial power users.

Environmental Issues

Burning coal for electricity generation carries significant environmental liabilities and impacts. This poses significant concerns with respect to the continued use of coal as an energy source. Addressing environmental concerns remains a major challenge for the industry. Coal-burning for electricity generation presents two principal environmental concerns: release of noxious substances to the atmosphere and greenhouse gas (GHG) emissions.

Coal-burning releases pollutants – sulphur dioxide (SO_2), nitrogen oxides (NO_x), mercury, and particulate matter – into the atmosphere. NSPI operates under a sulphur cap, instituted to address Nova Scotia's commitments under the 1988 Canada-Nova Scotia Acid Rain Agreement. Although the circulating fluidized bed combustion at Point Aconi reduces sulphur emissions by over 90 per cent for that plant, there is potential to decrease utility sulphur emissions further by installing scrubbers at Lingan and Point Tupper. Government and industry are dicussing initiatives to further reduce emissions of SO_2, mercury, and NO_x. If implemented, these initiatives will pose a challenge for the use of coal with high sulphur and mercury contents.

There are two opportunities for the release of GHG during the coal cycle: methane trapped in coal can be released to the atmosphere during underground mining; and fossil fuel combustion for electricity generation emits carbon dioxide.

The GHG emissions issue is being addressed by Canada's National Climate Change Process, by which the Canadian federal and provincial governments are assessing the opportunities and costs of ratifying the Kyoto Protocol. The continued use of coal may be impacted by any commitments that the province eventually makes under the climate change process, or by any fiscal instruments that are enacted nationally to encourage GHG emission reductions.

Regulatory Framework

Coal is defined as a mineral under the Mineral Resources Act, and is owned by the Crown. The rights to explore for coal, acquire ownership of an in-ground coal resource, and mine coal are regulated by this act, which is administered by the Department of Natural Resources.

In addition, the Department of Environment and Labour regulates all matters related to occupational health and safety and the environment.

Alternative Energy

Background

For the purposes of this discussion, alternative energy includes:

- biomass (wood) energy
- solar energy -- passive, active and photovoltaic
- wind energy
- small hydro and tidal energy
- alternative transportation fuels such as natural gas, propane and alcohol-based fuels
- geothermal energy
- energy from waste

History

In the past, alternative energy supplied nearly all of Nova Scotia's energy needs. As energy needs grew and fossil fuels became more widely available and less expensive, coal and then oil became the province's major energy sources. Interest in alternative energy was rejuvenated by the energy price shocks of the 1970s. Today many homes and businesses meet most of their heating needs with alternative energy sources, such as wood.

Economic Importance

Accurate statistics can be difficult to obtain for types of alternative energy that are not purchased from outside sources and, as a result, are not measured or recorded. Examples of this include passive solar energy, on-site biomass waste burned by commercial facilities, and residential fuel wood from personal wood lots or purchased from small suppliers selling on a cash basis.

The increased use of alternative energy sources can reduce the province's dependence on imported energy, cut operating costs, diversify the province's energy mix, and in many cases reduce the environmental impacts associated with energy produced using fossil fuels. The reduction of carbon emissions may have a significant impact on future mandatory reductions that would result from the ratification of an international climate change treaty.

Role in Energy Mix

Biomass (wood) energy

The largest biomass facility in the province is the Brooklyn Energy Center, a 22 MW co-generation plant fueled by wood waste. Numerous sawmills have installed sawdust-fired kilns to dry lumber. Other large-scale biomass heating systems provide heat to greenhouses, manufacturing facilities, hospitals, and schools. The residential use of wood fuel is expected to rise in 2001 as a result of sharply increased world oil prices.

Passive solar energy

Most buildings obtain some free heat from the sun. The sun can provide 30 per cent to 60 per cent of annual heating requirements by capturing the sun's energy through south-facing windows. The key components for superior solar performance are careful design, energy efficient windows and an energy efficient building envelope. Passive solar construction is cost effective at today's energy prices but it requires the thoughtful integration of the home's design with the features of the building lot.

Active solar energy

Active solar systems mechanically move heat from a solar collection system to its intended use. These systems usually work best with a year-round low temperature load like domestic hot water. Active solar systems can also supply space heat by preheating ventilation air or by combining its energy with low temperature radiant or fan coil heating systems. The largest solar panel manufacturer in Canada is located in Burnside. This company, Thermo Dynamics Ltd., exports most of its product overseas.

Photovoltaic energy

A world-wide research effort continues to improve the performance and cost effectiveness of photovoltaic systems, but per-kilowatt hour costs continue to be much higher than for power purchased from the grid. Photovoltaic systems have proven to be a dependable, easy-to-maintain source of electricity for remote applications. Typical uses include navigational aids, outdoor lighting, marine use, water pumping, and camp or cottage use.

Wind energy

Large utility-scale wind turbines can now produce electricity at a cost close to that of conventional power. Today's most cost-effective machines typically have capacities in the one megawatt range and have tower heights upwards of 200 feet.

A number of wind developers are currently investigating Nova Scotia's potential for wind farm development. For a project to proceed, detailed, site-specific wind monitoring data must be available and an acceptable power purchase rate must be obtained. Nova Scotia Power Inc. (NSPI) is currently attempting to negotiate a green power purchase agreement with the federal government. Utility-scale wind farm projects will likely be built within the next few years. A wind turbine manufacturing facility was announced for the province late last year.

A Dartmouth company, Atlantic Orient Canada, manufactures 50 kW wind turbines. These units are cost-competitive in remote areas that would otherwise generate electricity with a diesel generator set. Federal funding has been obtained to install 100 kW of wind capacity on Sable Island in 2001.

Small hydro energy

There are a small number of potential sites for a hydro development in Nova Scotia. Salmon habitat issues, local opposition, and environmental regulations make new dam construction difficult. Run-of-river installations are likely a more realistic option.

Tidal power

The Annapolis Tidal Generating Station has a capacity of 20 MW and has operated reliably since 1984.

The feasibility of building a large scale tidal project in the Bay of Fundy was extensively investigated in the 1970s and early 1980s. The project was abandoned due to its high cost, the cyclical nature of power production, fish mortality and the impact the project would have on maximum tidal heights on the eastern seaboard.

Alternative transportation fuels

Limited experiments with alternative transportation fuels have been undertaken in the past in Nova Scotia, but the lack of a local source of fuel made the widespread use of alternative transportation fuels unrealistic. As the natural gas industry develops in Nova Scotia, the promotion of a locally produced alternative transportation fuel in combination with new technology like fuel cells may provide an opportunity for advances in reducing transportation-related emissions.

Geothermal energy

Springhill has the only geothermal energy system in Nova Scotia. About a dozen Springhill area facilities have installed mine water source heat pump installations to reduce their energy costs. Conventional geothermal energy from hot springs does not exist in the province.

Energy from waste

This technology is an option for any organization with a source of combustible waste. The most financially attractive sites generally have a good match between the need for heat and the production of waste. A large year-round requirement for heat is also an asset. Other issues that affect project feasibility include the project's capital cost, fuel storage and handling issues, and any applicable environmental regulations. A good example of this is energy production from mill waste to dry lumber and to provide some of the electricity needed for the process. A number of Nova Scotian saw mills have installed units to recover energy from their waste stream.

Environmental Issues

Alternative energy sources can, in many cases, reduce the environmental impacts associated with energy produced using fossil fuels. The reduction of carbon emissions in particular may have significant impact on future mandatory reductions resulting from the ratification of an international climate change treaty.

Regulatory Framework

Most alternative energy sources are unregulated in Nova Scotia and therefore subject only to general business and consumer laws. There are a few, however, that fall under regulation. For example, the right to explore, acquire ownership, or develop geothermal resources is regulated by the Mineral Resources Act.

cost avoidance.

Most experts agree that Nova Scotia and Canada have not yet reached the levels of energy efficiency of other industrialized countries.

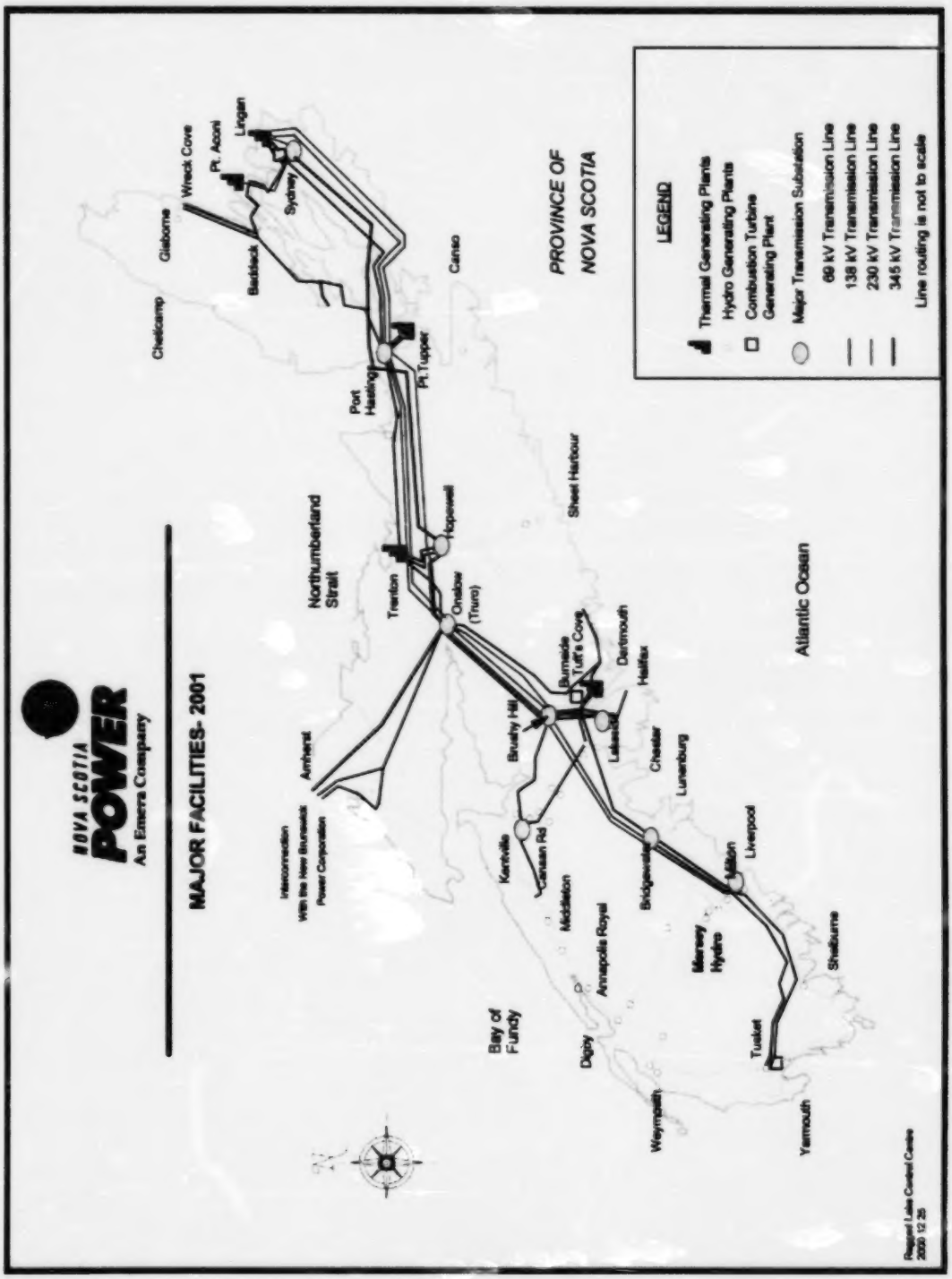
Many of the barriers to energy efficiency have changed little in the past decade. These barriers include:

- access to information on energy efficiency choices
- the availability of energy efficient products
- competition from other energy suppliers
- flat or declining prices in real terms
- the lack of capital to undertake energy efficiency projects
- a lack of concern about the security of energy supplies

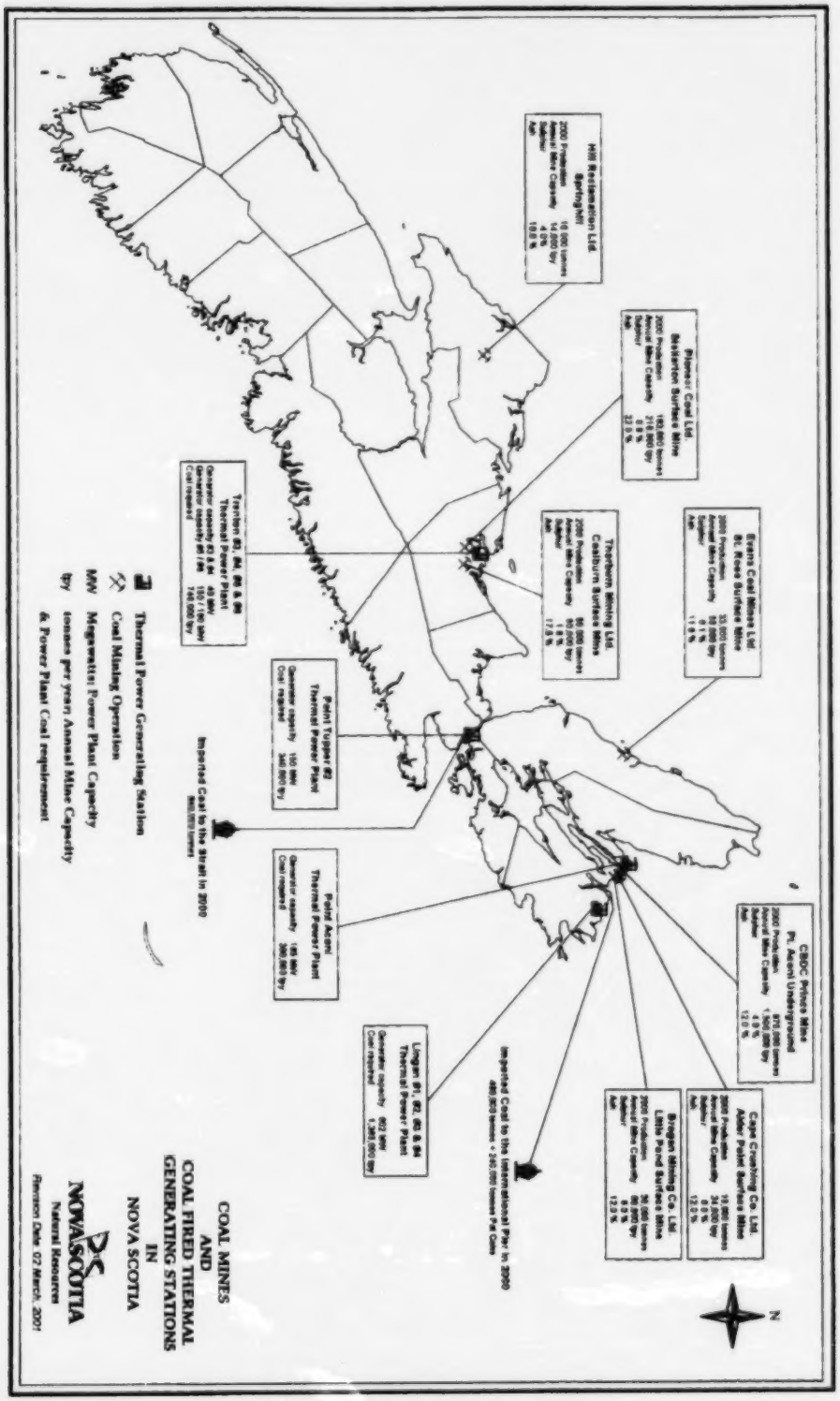
Since the late 1970s, governments have been involved in efforts to encourage energy efficiency in response to concerns over the cost and security of energy supply. Nova Scotia offered programs and projects in support of energy efficiency during this period. Efforts were reduced in the 1990s under stable energy prices and reduced concerns about security. Energy efficiency and conservation are now attracting renewed attention in light of concerns about global climate change and the role of fossil fuel consumption in producing GHG.

Offshore Oil and Gas

NSPI Generation and Transmission System



Coal Mines and Coal-fired Generating Stations



Global Climate Change

Overview

Global climate change is an important issue for our environment and our economy. It has the potential to affect all Nova Scotians, at home, work, and play, in the coming year, decade, and century.

The Intergovernmental Panel on Climate Change

The Intergovernmental Panel on Climate Change (IPCC) said in its most recent report that "there is new and stronger evidence that most of the warming observed over the past 50 years is attributable to human activities," that "human influences will continue to change atmospheric composition throughout the 21st century," and that change "will persist for many centuries."

The IPCC's latest predictions are that the earth's average surface temperature will rise between 1.4 and 5.8 degrees Celsius from 1990 to 2100. This is significantly higher than its 1995 estimate of a rise of 1 to 3.5 degrees Celsius. Predictions of sea level rise in the coming century range between 35 and 100 centimeters.

Greenhouse Gas Emissions and Global Warming

Carbon dioxide (CO_2) emissions produced by the burning of fossil fuel represent by far the greatest contributor to human-induced climate change. Fossil fuel consumption represents almost 90 per cent of Nova Scotia's greenhouse gas (GHG) emissions.

The world's nations signaled their intention to address GHG emissions and to work to stabilize these emissions at 1990 levels when they signed the 1992 United Nations Framework Convention on Climate Change (UNFCC).

In 1997, in light of new scientific evidence, representatives from these nations met in Japan at the Conference of the Parties Three (CoP3) and negotiated the Kyoto Protocol.

The protocol calls on 40 developed countries to reduce their GHG emissions by an average of 5.2 per cent below 1990 levels by the period 2008-12 as a first step in a coordinated international effort to address human-induced climate change.

Canada accepted a target of 6 per cent; the United States a reduction goal of 7 per cent; and the European Union a target of 8 per cent. Few countries have implemented the Kyoto Protocol and continue to negotiate rules and regulations.

The most recent meeting, CoP6 at the Hague in November 2000, ended without agreement on key issues regarding international emissions trading, carbon sequestration in agricultural soils and forest sinks, and penalties for non-compliance by countries that ratify the protocol.

The reality that climate change is at least partly caused by anthropogenic GHG emissions is now accepted by most governments, companies and individuals. As Sir John Browne, Chief Operating Officer of British Petroleum, said recently, "We can't ignore mounting scientific evidence on important issues such as climate change. The science may be provisional. All science is provisional. But if you see a risk, you have to take precautionary action just as you would in any other aspect of business."

Nova Scotia's Role

One can expect governments, companies, and individuals to respond to climate change in a step-by-step manner. In October 2000, Nova Scotia joined with other provinces and territories and the federal government in accepting a national implementation strategy on climate change (see www.nccp.ca).

The strategy is based on a phased approach to

action with periodic reviews and a flexible response in light of new scientific information and/or international events. It commits governments to exploring a list of early actions as part of the First National Business Plan on Climate Change.

Closer to home, in 1999, the Government of Nova Scotia held a round of consultations with stakeholders on climate change. Voluntary Planning, in summarizing the consultations in a report to government in February 2000, says "climate change is an issue which needs to be addressed immediately by all Nova Scotians with leadership to come from the provincial government" (see www.gov.ns.ca/natr/).

Nova Scotia's GHG emissions had risen from 19,400 kilotonnes (kt) of CO_2 equivalent to 20,100 kt of CO_2 equivalent by 1998, the last year for which figures are available. Emissions growth was fueled mainly by an increase in emissions from electricity generation and transportation. Emissions are estimated to be 21,100 kt of CO_2 equivalent by 2010. Achieving a 'Kyoto-like' target in the reduction in emissions in Nova Scotia would require a 16 per cent reduction from a business-as-usual emissions forecast.

Some of the options for reducing emissions include:

- using renewable energy sources
- switching to lower-carbon fossil fuels (e.g., oil to gas)
- improving energy efficiency
- sequestration of carbon in agricultural soils or forests
- capturing methane from landfills and underground mining
- storing generated CO_2 below ground
- emissions trading (the purchasing of emissions credits from other entities)

Future Outlook

How governments, companies, and individuals respond to climate change will have a long-term influence on energy supply and demand in Nova Scotia. With respect to energy supply, action to significantly reduce GHG emissions will have an impact on future fuel choices, providing a premium for energy sources with lower carbon content or that are carbon-neutral, such as wind, solar, hydro, and biomass.

Actions to reduce GHG emissions will affect the amount of energy we must purchase for our homes, cars, factories, and offices. As a result, lower demand can be expected to affect energy supply and consumer prices in the marketplace.

Air Contaminants

Overview

Air quality has long been an issue associated with fossil fuel use. Major air contaminant issues associated with fossil fuel energy production and consumption include acid rain, mercury, smog, ozone, and fine particulate matter.

The governments of Canada and Nova Scotia are party to international and national agreements covering various air emissions, from sulphur dioxide (SO_2) and nitrogen oxides (NO_x) that are the sources of acid rain, to other environmental pollutants, such as mercury. Some pollutants associated with fossil fuel consumption are considered to have significant health impacts; others are being addressed primarily because of concern about environmental degradation.

This is important to protect the health and natural environment of Nova Scotians. But as trade in energy increases, more jurisdictions are starting to consider the application of environmental performance standards as a pre-requisite for trade. Nova Scotia's industrial sector faces a range of new standards for air emissions in the years ahead.

Acid Rain

Acid rain largely results from sulphates and nitrates formed from SO_2 and NO_x, which are emitted into the atmosphere during the burning of fossil fuels. Watersheds and forests are especially sensitive to the effects of acid deposition because of the predominance of thin and poorly buffered soils throughout eastern Canada. U.S. emissions are considered to be responsible for more than 50 per cent of the acid deposition in eastern Canada.

Nova Scotia is party to a number of agreements covering acidifying emissions. The province has a SO_2 emissions cap of 189,000 tonnes/year, of which 145,000 tonnes is allocated to Nova Scotia Power Inc. Petroleum refining, transportation, and industrial and institutional uses of heavy fuel account for the remainder.

In June 2000, Nova Scotia joined other provinces, territories, and the federal government in endorsing the National Acid Rain Strategy for Canada Post-2000. The primary goal of the strategy is to ensure that sulphate deposition does not exceed critical loads in Canada. A critical load is the amount of sulphate that can be deposited on an area and still maintain 95 per cent of the lakes in the area at or above a pH level of 6. In addition, NO_x emissions may also have to be reduced in the future once critical loads for nitrogen have been established. Modeling shows that a 25 per cent cut in eastern Canadian and U.S. emissions of sulphur dioxide would reduce the area receiving harmful levels of acid rain by 34 per cent. A 50 per cent cut would allow all areas in Atlantic Canada to achieve less-than-critical loads of acid rain, but large areas in Ontario and Quebec would still suffer acid rain damage.

The Post-2000 strategy calls for a number of actions, including pursuing additional emission reduction commitments from the U.S. and establishing new SO_2 emission reduction targets in eastern Canada. Nova Scotia has yet to announce a new target under the strategy. SO_2 emissions may be reduced by using proven downstream technologies, such as scrubbers, or by switching to fuels with reduced sulphur content.

Nova Scotia also addresses air issues through the Conference of New England Governors and Eastern Canadian Premiers. In 1998, the governors and premiers agreed to an Acid Rain Action Plan and a Mercury Action Plan (see below). At their July 2000 meeting, they agreed to urge both Canadian and U.S. federal jurisdictions to reduce SO_2

emissions by 50 per cent below current commitments by 2010 and NO_x emissions by 20 per cent to 30 per cent below current commitments by 2007.

The Acid Rain Action Plan identifies steps to address aspects of the acid rain problem in the northeast that are within the region's control to influence.

Mercury

The Mercury Action Plan's regional goal is the virtual elimination of mercury emissions. Interim targets under discussion are a 20 per cent to 50 per cent reduction by 2005 from coal-fired utility boilers and 60 per cent to 90 per cent reduction by 2010. The chief energy-related source of mercury in Nova Scotia is coal combustion. Prince Mine coal has a relatively high mercury content. The use of imported coal by NSPI can reduce utility emissions. The need for the Mercury Action Plan is supported by numerous studies that document elevated levels of methyl-mercury in freshwater fish across the northeastern U.S. and Canada. Much of the mercury entering the waters of the region settles from the air or is deposited in rain or other precipitation.

Smog

Efforts are also being made to address smog, an issue of more concern to central Canada than to Nova Scotia. In 2000, Canada and the U.S. developed a final draft of an Ozone Annex to the Air Quality Agreement, calling for reductions in emissions of NO_x and Volatile Organic Compounds in 18 states and central and southern Ontario and southern Quebec. Reductions achieved under the Ozone Annex will reduce trans-boundary emissions in Nova Scotia.

The sulphur content of gasoline is also being addressed. Both the U.S. and Canada are committed to reducing sulphur in gasoline to 30 parts per million (ppm) by January 1, 2005. Average levels are currently above 300 ppm. Reductions of sulphur in diesel are also being sought.

Ozone and Particulate Matter

Canada Wide Standards for Particulate Matter and Ozone were ratified by federal and provincial/territorial governments (with the exception of Quebec) in June 2000. Meeting these ambient air quality concentration targets for ground-level ozone and fine particulate matter by 2020 will require a wide range of emission reduction actions by governments and result in significant reductions in SO_2 and NO_x. With the exception of trans-boundary ground-level ozone, and perhaps some localized effects, Nova Scotia is already very close to complying with these standards.

Conclusion

Fuel choice has significant impact on air issues. Some coals mined in Nova Scotia are very high in sulphur and contain mercury. Coal combustion and heavy fuel oil combustion are significant sources of SO_2 and NO_x; combustion of natural gas emits very little SO_2.

It is important to recognize that there are linkages among the different air contaminant issues. Some activities that will reduce one emission may also produce reductions in many others. On the other hand, some technical solutions for dealing with one pollutant may result in an increase in energy consumption leading to the increased production of GHG. A multi-pollutant approach to dealing with air issues related to energy production and use may represent the least-cost approach to dealing with the full range of air issues.

Energy Efficiency and Conservation

Overview

Energy efficiency and conservation reduce the demand for energy. This represents an alternative to finding new energy supplies, while at the same time reducing the environmental impacts of energy use.

Reducing the use of imported petroleum products improves Nova Scotia's energy security by reducing the need for imported crude oil. Conservation and energy efficiency can also help Nova Scotia in the following ways:

- improving the competitiveness of our goods and services industries
- maintaining and improving our standard of living
- creating jobs in energy products and services
- reducing environmental impacts associated with the development, production, distribution, and use of energy

Energy efficiency and conservation have a significant impact on energy supply and price. They offer a competing source of energy to conventional supplies. Consumers choose energy efficiency more frequently when energy prices are high or appear to be on the increase. This moderates increases and helps to bring supply and demand into balance.

Nova Scotia

Despite flat or declining energy prices in real terms between 1990 and 1997, Nova Scotia made gains in energy efficiency. Improvements were more significant in some sectors than in others.

For example, residential demand per household fell 12.3 per cent during this period. This allowed total residential end-use demand to remain relatively constant, despite a significant increase in the population and number of households.

End-use demand per capita fell less slowly during the same period, recording only a 2 per cent drop. This was mainly due to the substitution of electricity (produced from coal) for refined petroleum products.

End-use demand per dollar of real domestic product (RDP) also fell between 1990 and 1997, dropping 5.2 per cent. This means that every dollar of economic output in 1997 required 5.2 per cent less energy than in 1990.

Some sectors did not show significant improvements in energy efficiency. In the transportation sector, for example, new car energy use improved only marginally, dropping from 9.8 L/100 km to 9.6 L/100 km. The entire on-road vehicle stock improved more noticeably from an average of 10.5 L/100 km to 9.7 L/100 km over the same period, as newer models replaced those that were older and less fuel-efficient.

Future Outlook

As we look to the future, some sectors are expected to show larger energy efficiency gains than others. This is based on a business-as-usual forecast that assumes little change in existing government policies and stable prices that are more in line with the average during the 1990s rather than those of the last year.

Major gains are again expected in the residential sector, with energy use expected to decline another 3 per cent between 1997 and 2010. Residential demand per household is expected to fall a further 11.4 per cent.

Commercial sector energy use is expected to remain constant while industrial energy use is expected to decline 3.5 per cent.

Transportation, on the other hand, is expected to see a growth in demand of 13.6 per cent between 1997 and 2010 under a business-as-usual forecast. As the sector with the most rapid rate of growth in energy use, the transportation sector accounted for 43 per cent of Nova Scotia's end-use energy demand in 1997 and more than 25 per cent of greenhouse gas (GHG) emissions (second only to coal-fired electric power generation).

Road vehicles account for about 70 per cent of transportation energy use. Personal vehicles, of which there are about 325,000 in Nova Scotia (or 1.02 per household), account for about 50 per cent of transportation energy use. The fastest growing uses are for aviation, off-road use and on-road diesel.

Primary energy demand per dollar of real domestic product is expected to fall a further 21.5 per cent between 1997 and 2010 as natural gas, with its higher efficiency, replaces refined petroleum products and, to a lesser extent, coal. Primary energy demand is expected to grow by 9 per cent between 1997 and 2010.

Role of Government and Industries

Despite these gains, both past and projected, significant potential remains for energy efficiency improvements and is likely to remain untapped without new initiatives on the part of government and the energy industry.

For example, studies conducted by the Buildings Issue Table, established under the National Climate Change Process, indicate that the potential energy savings in existing houses is greater than 30 per cent. In new housing, the majority of homes constructed use 20 per cent to 40 per cent more energy for heating and water heating than R-2000 homes, a yardstick for energy efficiency in new home construction. The potential for improvement in existing commercial and institutional buildings has been estimated at 20 per cent of current energy use.

Since 1990, the Government of Canada has achieved a 19 per cent reduction in GHG emissions (tied to energy use) through building retrofits, better fleet management, downsizing of operations, and "green power" purchases. In addition, it is forecasting an additional 12 per cent improvement between now and 2010.

Most analyses identify transportation as the largest challenge to reducing energy use because of its direct impact on people's lives, affecting everything from where we live to how we travel to work and enjoy recreation. Transportation energy has become identified as a key element of Canada's standard of living. Choices with respect to land use, urban design, roads and public transportation have a profound effect on urban communities and how well they function.

Technology has great potential in the long run to reduce both energy use and emissions in the transportation sector, but technology alone is not seen as capable of producing the efficiency gains necessary to meet a 'Kyoto-like' target for reducing GHG emissions.

Changes in other areas are considered necessary if the growth in transportation energy demand and emissions is to be slowed and eventually reduced. These include reducing the level of transportation activity, using more efficient modes of transportation, improving fuel economy for vehicles, and lowering the carbon content of transportation fuels.

Transportation is a significant contributor to air pollution, particularly in large urban centers. For example, in 1995 transportation accounted for 52 per cent of all nitrogen oxides (NO_x) emissions, 40 per cent of carbon monoxide (CO) emissions, 20 per cent of volatile organic compound (VOC) emissions, and 5 per cent of particulate emissions in Canada. As a result, reducing transportation energy use is generally accompanied by other environmental benefits such as less smog and congestion, as well as greater convenience and

cost avoidance.

Most experts agree that Nova Scotia and Canada have not yet reached the levels of energy efficiency of other industrialized countries.

Many of the barriers to energy efficiency have changed little in the past decade. These barriers include:

- access to information on energy efficiency choices
- the availability of energy efficient products
- competition from other energy suppliers
- flat or declining prices in real terms
- the lack of capital to undertake energy efficiency projects
- a lack of concern about the security of energy supplies

Since the late 1970s, governments have been involved in efforts to encourage energy efficiency in response to concerns over the cost and security of energy supply. Nova Scotia offered programs and projects in support of energy efficiency during this period. Efforts were reduced in the 1990s under stable energy prices and reduced concerns about security. Energy efficiency and conservation are now attracting renewed attention in light of concerns about global climate change and the role of fossil fuel consumption in producing GHG.

Fishery and Oil and Gas Industry Co-existence

Overview

In Canada, both the fishing industry and the oil and gas industry receive licenses to exploit ocean and subsea resources. Both industries are highly regulated as they carry out their activities on the ocean surface, in the water column, on the ocean floor, and below. The regulations stipulate how they conduct their activities, their production, and the disposal of by-products and waste.

Neither the fishing industry nor the oil and gas industry completely overlaps the activities of the other. However, there are times and places where activities of the two industries could happen concurrently. In addition, if proper regulatory enforcement is not in place, and modern technology is not used properly, there may be damage to the environment from either industry. Accordingly, it is critical to ensure proper environmental requirements and controls are enforced, and that the two industries have forums and procedures to make sure their potential conflicts are minimized.

Experience

In many parts of the world, the fishing industry and the oil and gas industry have reached a good working relationship. These relationships typically have evolved over time and sometimes such accommodations have required a great deal of effort and time on both sides. For example, strong fishing organizations working together to represent the interest of their members in a focused problem-solving way was identified by the Scottish Fishing Federation as a key element in arriving at rules that are fair to both industries in the offshore petroleum areas of the North Sea.

Closer to home, the fishing industry and Sable Offshore Energy Inc. have developed a very successful relationship offshore Nova Scotia on matters ranging from arrangements on the timing and location of seismic activities, through to a protocol for handling gear damage claims. Such was also the case with the Cohasset/Panuke Oil Project. Another step in building confidence has been the installation of fishing observers on board all seismic vessels.

Issues

The issuance of three exploration licenses that border upon the shoreline on parts of northern and eastern Cape Breton again raised concerns about potential conflicts between the fishing industry and oil and gas industry, and also possible environmental effects of exploration activities. As a result, the federal Minister of Natural Resources and the Nova Scotia Minister for the Petroleum Directorate issued a joint directive to the Canada-Nova Scotia Offshore Petroleum Board on October 20, 2000. The directive was to conduct a public review of the effect of potential oil and gas exploration and drilling activities within Exploration Licenses 2364, 2365, and 2368.

The public review will address the following:

- **Socio-Economic Impacts**
  - Any impacts on the marine and shoreline environment and/or on the inshore or offshore fishing industry, tourism industry, or on marine transportation
  - Any specific industrial, business, or employment impacts that might be expected
  - The value of information gained in respect of resource assessment

- **Effects on the Ecosystems**

– The effects of seismic activity or drilling activity, including any potential or permitted discharges on finfish, crustaceans, marine mammals, sea turtles, seabirds, eggs and larvae, invertebrate resources and benthic communities in the license areas

– Expected changes in the behaviour of fish and other marine species in the license areas, and the significance of such changes, due to the presence and operation of drilling rigs, vessel traffic, and noise from all exploration and drilling activities

- **Mitigation of Impacts**

– The potential for mitigation of identified adverse impacts, including seasonal timing and geographic limitations on activities within the license areas

The government has publicly stated its belief that the petroleum industry and the fishing industry should be able to co-exist. However, it has also confirmed the long-standing policy that oil and gas activity will only be permitted to occur if there is reasonable assurance it is not likely to have a detrimental effect on either the fishing industry or the environment in which both industries operate.

Nova Scotia Provincial Profile

Estimates – Province of Nova Scotia Budgetary Summary (April 11, 2000 $ Thousands)

	Actual (1998-99)	Estimate (1999-00)	Forecast (1999-00)	Estimate (2000-01)
Ordinary Revenue	4,550,622	4,622,985	4,783,771	4,794,941
Net Expenditures				
Net Program Expenditures	4,005,760	4,231,177	4,262,030	4,146,012
Net Debt Servicing Costs	805,733	799,552	814,153	899,122
	4,811,493	5,030,729	5,076,183	5,045,134
	(260,871)	(407,744)	(292,412)	(250,193)
Surplus (Deficiency) for Government Organizations				
School Board Deficits and Pension Obligations	(33,657)	–	–	–
Other Organizations	(251,607)	–	–	–
	(285,264)	–	–	–
Surplus (Deficiency) for Government Enterprises				
Nova Scotia Resources Ltd.	(75,784)	(65,100)	(32,211)	(25,900)
Sydney Steel Corporation	(31,331)	(31,800)	(38,606)	–
Other Enterprises	267,853	8,000	8,000	8,000
	160,738	(88,900)	(62,817)	(17,900)
Provincial Surplus (Deficit)	(385,397)	(496,644)	(765,229)	(268,093)

Demography

Population (July 1 Estimates)

	1986	1991	1996	2000
Nova Scotia	889,321	915,068	931,235	940,996

In 2000, the province comprised 3.1% of the total Canadian population. The population density was 17.8 persons per square kilometer.

The Economy

Gross Domestic Product ($ Millions)

At Market Prices	1993	1996	1999
Current Dollars	18,308	19,436	22,407
Constant 1992 Dollars	18,193	18,641	20,865

Civil Labour Force and Employment

	1995	1999
Population 15+	719,800	740,800
Labour Force	428,900	452,000
Employed	377,100	408,600
Unemployed	51,700	43,300
Unemployment Rate	12.1%	9.6%
Participation Rate	59.6%	61.0%

Taxation

Nova Scotia offers a competitive tax structure for corporations. The 16% general rate is competitive with most other provinces. Nova Scotia's 15% fully refundable R&D credit is among the most generous in the country and the Small Business Corporate Tax rate is 5%. Canada Customs and Revenue Agency collects Nova Scotia's Income Tax so firms need only file a single return – at any Canada Customs and Revenue Agency office in the country. There is no payroll tax. The sales tax is harmonized with the Federal value-added tax, the goods and service tax, and therefore, offers input tax credits to suppliers of taxable sales.

Gross Domestic Product by Industry – Factor Cost ($ Millions 1992)

	1995	1999
Goods Producing	**3,921**	**4,406**
Resource Industries	814	674
Manufacturing	1,747	2,090
Construction	914	1,127
Utilities	447	515
Service Producing	**12,241**	**13,518**
Transportation, Storage & Comm.	1,237	1,662
Trade	2,039	2,399
Finance, Insurance & Real Estate	2,841	3,227
Community, Business & Personal Services	3,461	3,712
Government Services (excludes defence)	2,128	1,930
Other Service	535	589
Total*	**16,162**	**17,924**

*Figures may not add due to rounding

Employment by Industry (*000)

	1995	1999
Goods Producing		
Agriculture	6.7	6.9
Other Primary	14.7	15.0
Utilities	2.4	2.1
Manufacturing	40.2	45.0
Construction	20.8	21.8
Total	**84.7**	**90.7**
Service Producing		
Transportation & Warehousing	17.3	21.0
Wholesale & Retail Trade	64.0	70.7
Finance, Insurance, Real Estate & Leasing	21.4	23.0
Community, Business & Personal Services	157.0	177.6
Public Administration[1]	32.7	25.6
***Total**	**292.4**	**317.9**
***Total Employment**	**377.1**	**408.6**

*Numbers do not total due to rounding; [1]Excludes defense

Construction

Capital Expenditures ($ Millions)

Expenditures	1996(a)	1999(pa)	2000(ri)
Construction	1,746.2	3335.6	2,353.4
Machinery & Equipment	1,263.0	1,750.5	1,732.8
Total	**3,009.2**	**4,304.7**	**4,029.9**

(a) – actual; (pa) – preliminary actual; (ri) – revised intention

Trade

International Trade – Nova Scotia Exports by Destination ($ Millions)

	1995	1999
United States	1,983	3,082
Other European Community	353	287
Japan	162	182
United Kingdom	109	117
Other Countries	369	315
Total	2,976	3,983

Nova Scotia Exports by Major Commodity Groups ($ Millions)

	1995	1999
Fish & Fish Preparation	792	993
Paper & Paperboard	304	487
Transportation Equipment	55	343
Wood Pulp & Similar Pulp	380	166
Non-Metallic minerals, Mineral Fuels	157	144
Lumber	24	251
Other Commodity Groups	1,264	1,599
Total	2,976	3,983

Nova Scotia Imports ($ Millions)

	1995	1999
Total	4,130	4,522

Energy Sector Regulatory Profile

Various aspects of the energy industry in Nova Scotia are subject to regulation. Some of these regulations are specific to the energy industry, while many others reflect the general regulatory regime for all businesses. These include the environment, fish habitat, labour, crown lands, onshore minerals, municipal planning, occupational health and safety, and taxation.

Oil and Natural Gas – Offshore

Offshore petroleum development and production is subject to joint federal-provincial regulation.

In 1982, differences with respect to jurisdictional ownership of the offshore between Canada and Nova Scotia were put aside with the signing of the Offshore Accord. Both governments now share regulatory responsibility through the Canada-Nova Scotia Offshore Petroleum Board (CNSOPB), which is an independent agency.

The primary regulatory functions of the CNSOPB include:

- ensuring safe working conditions for offshore operations;
- permitting and licensing of offshore exploration;
- facilities construction and production;
- environmental protection; and
- monitoring offshore industrial benefits and employment.

In addition, policy matters and fundamental decisions (i.e., regarding exploration permits, development agreements, etc.) are handled jointly by the federal and provincial ministers responsible for Natural Resources Canada and the Nova Scotia Petroleum Directorate.

The Petroleum Directorate was established in December 1997 to consolidate policy-making and co-ordinate the petroleum activities of the government of Nova Scotia. It serves as government's focal point in the development of the province's oil and gas resources, both offshore and onshore. The Petroleum Directorate is responsible for the Petroleum Resources Act. This act provides for the disposition of rights to explore and develop offshore and onshore petroleum resources in areas of provincial responsibility.

Oil and Natural Gas – Onshore

Onshore petroleum resources are owned by the province. The Petroleum Directorate regulates onshore petroleum exploration by granting licenses to conduct exploration and by monitoring practices and procedures while conducting geophysical activity (i.e., seismic, etc.) or drilling activities. In the event that petroleum resources are discovered, the Petroleum Directorate is responsible for issuing a production lease, which grants the right to extract the resource.

Onshore petroleum exploration and production may involve the use of Crown land. The Crown Lands Act provides ministerial authority to manage and administer all Crown lands in the province, and, in particular, to provide permission for the use of Crown land, and set conditions under which these lands may be used.

The Department of Environment and Labour regulates all matters related to the environment and occupational health and safety.

The Nova Scotia Utility and Review Board is the provincial regulator for gas distribution and gas sales in the province. The board is responsible for approving intra-provincial pipeline construction and operation, setting pipeline rates, tolls, charges, and terms of service, and awarding gas distribution franchises and gas sales licenses.

The Utility and Review Board is the primary regulatory body for the Sempra Atlantic Gas distribution system network. It should be noted, however, that while the distribution of natural gas is a regulated monopoly, the marketing and sales of natural gas commodity are subject to competitive market forces. As a result, the delivered cost of natural gas (commodity and transportation) is not subject to the same degree of price regulation faced by electricity (see below).

There is some regulatory overlap in the onshore industry with the federal government, depending upon location and type of activity. Offshore developments that are integrated with onshore processing facilities or onshore pipelines are a couple of examples.

Pipelines

The National Energy Board regulates inter-provincial and international gas transmission lines, and the exporting and importing of natural gas.

The primary function of the board in Nova Scotia is to regulate construction, operation, environmental protection, tariff, and rates for the main pipeline of Maritimes and Northeast Pipeline Inc. from Goldboro to the New Brunswick border, and the natural gas pipeline laterals – Halifax and Point Tupper.

Provincially, the Utility and Review Board regulates the Sempra local distribution system.

Electricity

Electricity is a price-and-supply regulated monopoly in Nova Scotia.

The Utility and Review Board regulates all aspects of electricity, including generation, transmission, distribution, marketing, and rates.

The National Energy Board regulates the export of electricity.

Nova Scotia Power Inc. provides more than 90 per cent of the province's electricity.

On the demand-management side, the Energy-Efficient Appliances Act prescribes energy efficiency standards for certain appliances sold in the province. The attendant regulations prescribe energy performance standards and requirements.

Coal

Coal is defined as a mineral under the Mineral Resources Act, and is owned by the Crown. The rights to explore for coal, acquire ownership of an in-ground coal resource, and mine coal are regulated by this act, which is administered by the Department of Natural Resources.

The Department of Environment and Labour regulates all matters related to occupational health and safety and the environment.

Alternative Energy

Most alternative energy sources are unregulated in Nova Scotia. They are subject only to general business and consumer laws.

Geothermal resources, however, are regulated by the Mineral Resources Act. It regulates the rights to explore for geothermal resources, to acquire ownership of an in-ground geothermal resource, and to develop a geothermal resource.

Oil and Gas Industrial Benefits and Labour Force Skills

Overview

The regulation of the oil and gas sector of the energy industry is unique in that industrial and employment benefits must be addressed as part of the regulatory approval process in Nova Scotia. This is in contrast to general economic benefits requirements that have been common in other regulated energy and utility industries (i.e., uniform province-wide pricing and/or distribution charges).

The requirement for industrial benefits dates back two decades to a time when energy mega-projects were seen as being major elements in economic growth for Canada as a whole. It was also acknowledged at that time that the decision-makers and major suppliers for these projects were dominated by foreign-headquartered multinationals. They had limited knowledge of Canadian supply capabilities and little interest in seeing indigenous Canadian firms develop technical competence in this sector.

Today, this requirement for industrial benefits plans is largely confined to "frontier" oil and gas regions, including Nova Scotia, Newfoundland, and the Yukon and Northwest Territories.

Offshore Benefits

Benefits plans for oil and gas activity in the offshore area have been required since the early 1980s, and are under the regulatory oversight of the Canada-Nova Scotia Offshore Petroleum Board (CNSOPB). The Nova Scotia Petroleum Directorate advises the CNSOPB on benefits issues on the provincial side, and Natural Resources Canada co-ordinates advice on the federal side.

The current legislative requirement is that benefits plans must be submitted and approved before activities in this sector are sanctioned by the regulator. These benefits plans are largely focused on a process of providing full and fair opportunities for Nova Scotian and other Canadian suppliers to bid for work as suppliers for those activities and projects with a "first consideration" on a competitive basis for Nova Scotia-sourced goods and services.

Labour Force Skills

Nova Scotia's offshore is currently in its "greenfield' stage, which means it is a new, relatively unexplored area. Alternatively, areas such as Alberta, Norway, and Scotland are considered "mature" markets where oil and gas activity has been strong for decades and production is starting to level off. Based on the experiences of these markets, Nova Scotia can expect to experience steady growth in its oil and gas industry for the next 20 or 30 years before it matures.

This is very important when examining the training and skills that will be required by the petroleum industry as it develops offshore Nova Scotia. In order to ensure that we have a sufficient number of Nova Scotians with the proper qualifications to work in the petroleum industry over the next few decades, we must identify areas of opportunities and develop our workforce accordingly.

To achieve this, we can look to the experience of the more mature markets. This can help us determine the number of workers and the areas of expertise required by the petroleum industry over time. This information is invaluable as it allows us to develop programs in our educational institutions that will enable students to gain the knowledge and skills they need to obtain employment in the petroleum industry.

The areas of employment in this industry are diverse. They include:

- engineering, geology and geophysics
- technicians and technology (e.g., electrical, instrumentation, mechanics)
- equipment, manufacturing and processing
- construction, fabrication and maintenance
- exploration, drilling and production
- management, administration, sales and logistics

With the offshore oil and gas industry starting to take off in Nova Scotia, there is some concern over whether our labour force has the skills and training required to meet the employment challenges that lie ahead.

In terms of the direct employment impact, there are approximately 1000 Nova Scotians working in the petroleum industry today. Based on experience in other markets, it is estimated that over the next 20 years the industry could employ anywhere from 2.5 per cent to 4 per cent of our total workforce – the equivalent of 12,000 to 18,000 jobs. The potential for Nova Scotia is significant.

Onshore Benefits

In Nova Scotia, pipelines under provincial regulation, provision of onshore petroleum rights, and gas distribution utilities all have regulatory provision for benefits plans. Thus, Sempra Atlantic Gas has a Nova Scotia Utilities and Review Board-approved benefits plan under which they are operating as they develop their local distribution company franchise in the province. The Nova Scotia Petroleum Directorate is monitoring this plan for the Utility and Review Board. However, pipelines such as the Maritimes and Northeast pipeline, which is regulated by the National Energy Board have no industrial benefits requirements.

Conclusion

Generally, benefits plans require companies to follow a process to ensure the provision of full and fair access, and do not commit a company to achieve any particular result. However, these plans do require estimates of results and a procedure to monitor or audit these results. So there can be non-regulatory pressure to encourage achievement of the estimated results.

As broader national and international trade and investment agreements develop, increased pressure will be brought to bear to reduce any constraints on corporate procurement decisions, such as the benefits plans this sector now represents. However, as oil and gas exploration and development is essentially a new economic sector in the province, requirements for benefits plans can affect how quickly this sector develops. It is interesting to note that much of the foreign expertise in this sector was developed in the 1970s and 1980s in countries such as Norway and Britain. These countries had a more protected and proscriptive local benefits business environment than is possible in more globally competitive environment today.

Oil and Gas Royalty Regime

Purpose

In 1986, Nova Scotia and Canada settled a long-standing dispute on ownership and jurisdiction over offshore resources. The dispute ended with the signing of the Offshore Accord which was put into legislation in 1987. Among other things, that legislation gives the province the right to collect royalties. When the province set up its royalty regime it had a number of choices. It could try to take a flat percentage of project revenues, or it could make the system sensitive to the investment required and the risk that goes into finding the resource in the first place.

The decision adopted reflects the fact that the resource belongs to the people and a suitable level of "economic-rent" must be established for the province on behalf of the people. It also recognizes that Nova Scotia's oil and gas industry is in its infancy with relatively little knowledge of the potential resources, and has limited supporting infrastructure. Such a "greenfield" area presents additional risk and demands extra effort from developers in comparison to more mature areas. Establishing a fair and competitive royalty regime takes into account the rewards due to those who undertake this effort and risk.

Overview

Formal royalty arrangements were established in July 1999. A royalty agreement was entered into with the owners of the Sable Offshore Energy Project (SOEP), and a general or "generic" regime was concurrently developed to cover future projects. Both regimes are based upon the requirement that the royalty payments will be calculated taking into account both the value of the natural gas and the natural gas liquids, as well as the level of profits being made.

In technical terms, the royalty rate is set at the start of a project as a percentage of a project's gross revenues. As time goes by, the net revenues from a project are expected to result in full repayment of a project's original investment (the point at which the project achieves "simple payout") and also earn a return on that investment, referred to as the "return allowance".

Earning a return allowance is similar to earning simple interest. On a monthly basis, the project's unrecovered costs (the principal component of the calculation) is multiplied by prescribed return allowance rates, which are based on the long-term Bank of Canada bond rate plus an additional percentage. The province receives higher levels of royalties or "royalty tiers" as the cumulative profitability of the project surpasses succeedingly higher thresholds of return, referred to as achieving "payout".

At one such payout threshold, the royalty regime switches to a percentage based upon net revenues. Gross revenues include all the revenues received less any transportation costs to deliver the product to the customer; net revenues measure the project's profitability. Net revenues are determined by deducting the project's direct capital and operating costs from the gross revenues.

Rates

The SOEP Regime

In the case of the Sable Offshore Energy Project, the initial royalty rate is 1 per cent of gross revenues for the first 36 months of production. The project then moves to further gross revenue royalty tiers: first a 2 per cent tier and then a 5 per cent tier once a "primary" payout threshold is achieved. The move to net royalties comes once "secondary" payout is achieved. In this first net

revenue tier, royalties are calculated at a rate of 30 per cent of net revenues, with a further step-up to 35 per cent when "final" payout is attained.

Generic Regime

Under the terms of the generic regime, a project starts with an initial royalty tier of 2 per cent of gross revenues. Then, like the SOEP regime, as succeedingly higher levels of payout are achieved, the regime moves to more lucrative royalty tiers: a 5 per cent gross revenue tier, then two net revenue tiers – the first a 20 per cent tier and the final tier at 35 per cent. As an incentive for exploration in areas where no discoveries have been made, i.e., the first project in such a "high-risk" new area, the net royalty rate has a ceiling of 20 per cent.

Example of Royalty Revenues – The SOEP Regime

The SOEP royalty regime was developed based upon the following assumptions:

- it would produce 3.5 trillion cubic feet of gas over 25 years;
- it would receive $1.80 US (in 1995 dollars) per million British thermal units at the Goldboro gas plant gate (i.e., the final marketplace price minus any transportation costs in getting there); and
- after that, natural gas prices would rise at an assumed rate of inflation of 1.5 per cent.

Under these assumptions the total royalties from SOEP were originally projected to be $2.5 billion.

In fact, short-term prices for natural gas have exceeded expectations, peaking in December 2000 at approximately five times the forecast price. As part of the SOEP production is under long-term contract pricing, it cannot be assumed that all gas sold is receiving the higher market price. Nevertheless, a significant portion is under short-term pricing and the profitability of the project at this time is much higher than forecast.

The effect of such an increase in prices on royalties is two-fold. First, higher prices mean higher gross revenues, directly increasing royalties. Second, higher gross revenues advance project payout and the higher net revenue tiers for the province come into effect sooner than anticipated. Indeed, current projections indicate that net royalties could be achieved as early as 2005, rather than the originally projected date of 2008.

It should be noted that under federal equalization rules, the actual increase in provincial revenues is significantly less because equalization payments go down as offshore revenues rise. The formula results in a $0.70 drop in equalization for each additional dollar received from the offshore.

Glossary of Terms

Acid Rain: Also called acid precipitation or acid deposition, acid rain contains harmful amounts of nitric and sulphuric acids formed primarily by nitrogen oxides and sulphur oxides released into the atmosphere when fossil fuels are burned. It can be wet precipitation (rain, snow, or fog) or dry (absorbed gaseous and particulate matter, aerosol particles, or dust).

Anchor Load: Large commercial or industrial end-users whose consumption forms the initial load required to build or expand the natural gas delivery system.

Bcf (Billion Cubic Feet): A volume measurement of natural gas. Enough to supply the space and hot water heating requirements of 8,300 Nova Scotia homes per year.

Biomass: Energy resources derived from Organic matter. These include wood, agricultural waste and other living-cell material that can be burned to produce heat energy. They also include algae, sewage, and other organic substances that can be used to make energy through chemical processes.

Btu (British thermal unit): The Btu is a unit of measurement for energy. It represents the amount of heat that is necessary to raise the temperature of one pound of water by 1 degree Fahrenheit. One Btu equals 1054 joules.

Bundled, bundling: The combination of two or more services that could be provided separately (such as the transportation of gas and the sale of gas) into a single service (such as the delivered gas service traditionally offered to residential and small commercial gas consumers).

Bypass: Bypass occurs when an end user connects directly to the main transmission pipeline or a lateral of it. That end user is bypassing a local delivery system.

Capacity: The maximum power that a generating unit, generation station, or other electrical apparatus can supply, usually expressed in megawatts.

City Gate: The delivery point or the point of inter-connection between long-distance transmission pipelines (usually inter-provincial or inter-state) and local distribution companies.

Coalbed Methane: Natural gas (principally methane) contained in coal seams.

Co-firing: The process of burning natural gas in conjunction with another fuel.

Cogeneration: The simultaneous production of electricity and steam from one energy source (e.g., natural gas, oil, biomass).

Combined Cycle Plant: An electric generating station that uses waste heat from its gas turbines to produce steam for conventional steam turbines.

Condensate: The liquid resulting when a vapour is cooled or put under pressure. Also, liquid hydrocarbons condensed from gas and oil wells.

Cost of Service: A term used in public utility regulation to mean the total number of dollars required to cover the electrical utility's or local distribution company's costs (i.e., revenue requirements). The costs can include an amount to cover operation and maintenance expenses and other necessary costs, such as taxes (income taxes, depreciation, depletion and amortization of the property not covered by ordinary maintenance). A "fair" return on capital and owners' equity is also allowed to ensure that the local distribution company or electrical utility maintains financial integrity, attracts new capital, and compensates the owners for the risks involved.

Crown Land: Land under the administration and control of the provincial and federal governments.

Demand-Side Management : The planning, implementation, and monitoring of utility activities designed to encourage consumers to modify patterns of electricity use, including the timing and level of electricity demand. It refers only to energy and load-shape modifying activities that are undertaken in response to utility-administered programs. It does not refer to energy and load-shape changes arising from the normal operation of the marketplace or from government-mandated energy efficiency standards.

Development Well: A well drilled for natural gas (or crude oil) within a proven field or area for the purpose of completing the desired pattern of production.

Discovery Well: An exploratory well that encounters a previously untapped oil or natural gas deposit.

Distribution Tariff: The charge the customer pays for the local transportation (natural gas) or distribution service (electric) provided by the local distribution company.

Distributor: A company that distributes natural gas to end users. Distributors control the gas between the city gate and the end user's meter. Distributors are frequently referred to as local distribution companies.

Dry Gas: Raw natural gas with a relatively low concentration of natural gas liquids (ethane, propane, butane, pentanes, and condensates).

Dry Hole: A well that does not yield enough gas and/or oil to support commercial production.

End User: A person or company who actually consumes natural gas (as opposed to one who sells or resells it).

Exploratory Well: A well in an area where petroleum has not previously been found or one targeted for formations above or below known reservoirs.

Gas Distribution System: The distribution and service lines, and their associated control devices, through which gas is conveyed from transmission lines, or local sources of supply, to a customer's meter.

Gas Reservoir: A rock layer that forms a trap for the accumulation of natural gas.

Geophysical Survey: Searching and mapping the subsurface structure of the earth's crust using geophysical methods (e.g., seismic) to locate probable reservoir structures capable of producing commercial quantities of natural gas and/or crude oil.

GHG: Greenhouse gas/gases. The principal GHG are carbon dioxide, methane, nitrous oxide, chlorofluorocarbon and halocarbons and water vapour.

Greenhouse Effect: The increasing mean global surface temperature of the earth caused by gases in the atmosphere. The greenhouse effect allows solar radiation to penetrate, but absorbs the infrared radiation returning to space.

Green Power Marketing: Commercial process of marketing and selling the output of certain generation sources identified as "green" because they meet certain standards for being deemed environmentally preferable.

Hydrocarbon: An organic compound containing only hydrogen and carbon. There are hundreds of these compounds, and they may occur as gases, liquids, or solids.

Interconnected System: Two or more individual transmission systems that have one or more interconnecting tie lines.

Interruptible Service: Interruptible service contracts allow a distributing party to temporarily suspend delivery of gas or electricity to a buyer in order to meet the demands of customers who purchased firm service. Interruptible service is less expensive than firm service, and is used by customers who can either accommodate interruption, or switch to alternative fuels temporarily.

Kilowatt-hour (kWh): A standard unit for measuring electricity. Residential customers' rates are usually expressed in cents per kilowatt-hour.

kWh Metering: Metering capable of measuring the total usage or flow of kilowatt-hours on a continuing basis, but not capable of recording and tracking such usage over shorter intervals, such as every hour or half-hour.

Local Distribution Company: An entity that owns a distribution system for the local delivery of energy to consumers.

Light-handed Regulation: A streamlined regulatory method designed to speed up the process and reduce the cost while balancing the interests of the various parties and allowing the regulator to carry out its statutory duties.

Load: The amount of electric power or natural gas volume delivered or required at any specific point or points on a system. The requirement originates at the energy-consuming equipment of the consumer.

Mcf (Thousand Cubic Feet): Mcf stands for 1000 cubic feet. It is a unit of measure that is more commonly used in the low volume sectors of the gas industry.

Megawatt (MW): Unit of electrical power, used to measure the generating capability capacity of a generating station or the maximum demand of an electricity consumer.

Megawatt-hour (MWh): A measure of the energy produced by a generating station over time: one megawatt of power produced for 24 hours provides 24 megawatt-hours of energy (as does 24 megawatts produced for one hour).

Meters or Metering: Equipment that measures and registers the amount and direction of energy quantities over a period of time.

Methane: The principal constituent of natural gas; the simplest hydrocarbon molecule, containing one carbon atom and four hydrogen atoms.

Mmcf (million cubic feet): Unit of measure for volume of natural gas. Enough energy to supply the annual space and hot water heating requirements of eight homes in Nova Scotia.

National Energy Board: The federal regulatory agency in Canada which authorizes oil, natural gas and electricity exports, certifies inter-provincial and international pipelines and designated inter-provincial and international power lines, and sets tolls and tariffs for oil and gas pipelines under federal jurisdiction.

Natural Gas Liquids: Liquids obtained during natural gas production, including ethane, propane, butanes, and condensate.

Off Peak Period: The period of time during a day, week, month, or year when gas or electricity use on a particular system is not at its maximum.

Particulate Matter: Unburned fuel particles that form smoke or soot. A chief component of exhaust emissions from heavy-duty diesel engines.

Peak-Use Period: The period of time when gas or electricity use on a particular system is at its maximum. This is the period when gas/electricity supply is most likely to be suspended for interruptible service customers. Distributors also employ techniques such as peak shaving to soften the impacts of high demand on the pipelines.

Peaking Capacity: Generating capacity typically used only to meet the peak demand, the highest demand for electricity during the day. Peaking capacity is typically provided by hydroelectric generators or gas-fired combustion turbine generators.

Performance-Based Regulation: Any rate-setting mechanism that attempts to link rewards (usually profits) and penalties to desired results or targets.

Petroleum: A naturally occurring mixture of hydrocarbons in gaseous, liquid, or solid form.

Pipeline: All parts of the physical facility through which gas is moved in transportation. Includes pipe, valves, appurtenances attached to the pipe, compressor units, metering stations, regulatory stations, delivery stations, holders, and fabricated assemblies.

Postage Stamp Rate: A rate that applies to a particular area that does not vary by the distance between the receipt point and the delivery point. For example, the Maritimes and Northeast Pipeline will have a postage stamp rate in Nova Scotia because the transmission rates will be the same for gas delivered by the pipeline to any location in Nova Scotia served by the mainline or any of the laterals.

Potential Resources: The volume of natural gas or oil thought, based on geological knowledge, to exist. Not proven to exist.

Projected Marginal Energy Cost: The projected sum that has to be paid for the next increment of product or service. The marginal cost of electricity is the price to be paid for kilowatt-hours above and beyond those supplied by available generating capacity.

Rate of Return: The return allowed to be earned (generally based on the cost of capital determination) or actually earned by a utility company. The rate of return is generally calculated by dividing the net operating income (as defined) by the rate base.

Rate of Return Regulation: Process of regulation in which the regulator sets rates at a level that will cover operating costs and provide an opportunity to earn a reasonable rate of return on the invested property devoted to the business. Also known as cost of service regulation.

Regulation: The overseeing of a market by an administrative agency or regulator. Includes any intervention in the markets to set rates and other terms and conditions under which the regulated service must be provided. Traditional regulation attempts to put a monopoly under restraints to achieve prices (rates), output and investment levels comparable to those that occur under a competitive market.

Regulator: An entity that, through power of law or some other legitimate means, has the authority to impose regulation.

Reliability: The degree of performance of the elements of the bulk electric system that results in electricity being delivered to customers within accepted standards and in the amount desired. Reliability may be measured by the frequency, duration, and magnitude of adverse effects on the electric supply.

Reserves: Volumes of hydrocarbons (measured in Bcf, Tcf or billion of barrels) that are considered to be economically recoverable using current technology.

Resources: Volumes of hydrocarbons that are deemed to be technically recoverable, but may not have been delineated or may not presently be economically produced.

Retail Market or Retail Access: A market in which electricity and other energy services are sold directly to consumers by competing suppliers.

Royalty: The amount paid to the owner of petroleum or mineral rights as payment for the petroleum or mineral removed. In natural gas production, the royalty is usually based on a percentage of the total production and profits.

Storage Facilities: Facilities used for storing natural gas. They generally come in two forms: gaseous storage facilities and liquified natural gas storage facilities. Gaseous storage facilities are usually salt caverns or depleted natural gas or crude oil reservoirs.

Stranded Costs/Investment: Costs that cannot be recovered from market prices. With respect to electricity competition, stranded investments are those assets owned by a utility that would become uneconomic in a competitive market.

System Operator: The entity with the responsibility to monitor and control an electric system in real time. (The term can also refer to the individual at an electric system control center who is monitoring and controlling the electric system in real time).

Tariff: The terms and conditions under which a service or product will be provided. Includes the rates or charges that users of service or product must pay. Tariffs are usually proposed by the service or commodity provider, and are subject to regulatory approval. Typically, the rates and terms for obtaining transmission service are set forth in a tariff.

Tcf (Trillion Cubic Feet): A volume measurement of natural gas.

Transmission: The movement or transfer of electric energy or natural gas over an interconnected group of lines and associated equipment between points of supply and points at which it is transformed for delivery to consumers, or is delivered to other electric systems. Transmission is considered to end when the energy is transformed for distribution to the consumer.

Transmission System: Pipelines or wires that transport energy over long distances (usually from supply to market regions or to other transmission systems). A gas transmission system usually has a linear configuration and large diameter pipe. It operates at high pressures. An electricity transmission system usually operates at high voltage.

Unbundled Services: Unbundling, or separating, pipeline transmission, sales, and storage services, along with guaranteeing "open access" to space on the pipelines for all gas shippers.

Unbundling, unbundled: The term is used to describe pricing models where each natural gas service is individually priced and often marketed separately from service on the pipes in the ground.

Upstream: Facilities or operations performed before those at the point of reference. Gas production is upstream from pipeline transportation.

Utility and Review Board: The regulatory agency in Nova Scotia that oversees gas distribution, gas marketing, and the electricity industry.

Wet Gas: Raw natural gas with relatively high concentrations of natural gas liquids (ethane, propane, butane, penances, and condensates).

Wheeling: The use of an interconnected transmission system to implement electricity transactions that transmit power into (wheeling in), within, out of (wheeling out), or through (wheeling through) that system.

Wholesale Market: This refers to the market in which electricity and other energy services are sold to wholesalers/retailers/distributors (who in turn sell to retail or end-use customers). A wholesaler/retailer/distributor of power would have the option to buy its power from a variety of generators or suppliers, and the generators or suppliers would be able to compete to sell their power to a variety of wholesalers/retailers/distributors.